TOOLING & PRODUCTION Magazine

OCTOBER 1958

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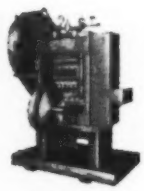

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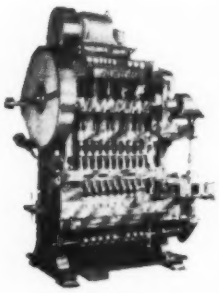

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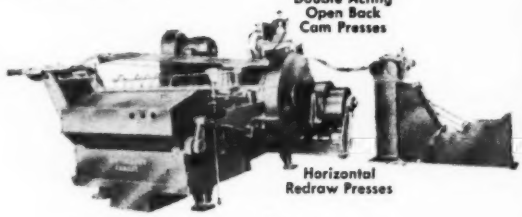

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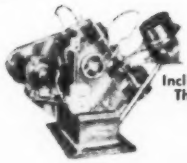

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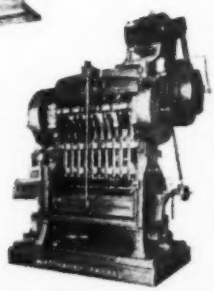

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CIRCLE INFORM-A-GRAM KEY NO. 4

TOOLING & PRODUCTION Magazine

OCTOBER 1958
VOL. XXIV No. 7
GEORGE J. HUEBNER, Founder

PERSONALLY SPEAKING

Dear T&P Reader:

The eyes of the nation will be on Ohio on election day next November. On the ballot by initiative petition will be an issue which sponsors have chosen to call the "right to work amendment." To anyone not familiar with this proposal, the title is something of a mis-nomer. What it means, of course, is prohibition of the "closed shop."

Some seventeen states already have laws making illegal the requirement of union membership to hold a job. None of these states, however, are as important industrially as Ohio. The vote will be a highly significant test considering that the state of Ohio is one of the top three or four in manufacturing activity. To many people, the most important feature of the program in Ohio is the opportunity of self-determination. I believe this will be the first opportunity ever afforded the people of Ohio to express themselves specifically on this question.

Proponents of the bill claim that its passage will require union leadership to deliver more value to members to stay in business. Opponents object on the basis that the bill would permit many workers to "free-load," getting benefits of union membership without any contribution.

There is one argument coming from the opposition that conscientious citizens of this nation certainly cannot accept. It is an inference that this issue should not be on the ballot because it is not something that the people are competent to decide. I thought such viewpoints died with the ending of the 18th Century.

Now that this issue is on the ballot as a result of over 600,000 voters signing petitions for it, I hope that all people, regardless of viewpoints, will make up their minds to abide by the decision of the people. Past history has established that some unions have maintained membership through intimidation if there was no other way.

If this amendment passes, union leadership should abide by it and aid in enforcing it until there would be a change through proper democratic processes. If it is defeated, I'm sure proponents of the amendment will be satisfied that they have given the people the opportunity to speak.

Cordially yours,

Ray Huebner

Publisher

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Editorial and Business Offices: 1975 Lee Road, Cleveland 18, Ohio, FAirmount 1-4040
Printing Office Address: P.O. Box 1494, Louisville, Ky. (For Plate Shipments Only)

Published Monthly by HUEBNER PUBLICATIONS, INC.

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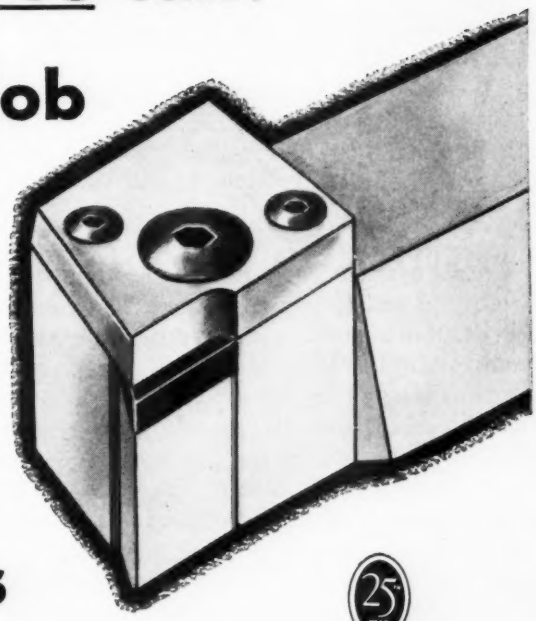

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CIRCLE INFORM-A-GRAM KEY NO. 5

John Dewhurst tells how the Moore Jig Borer pays off in production of instrument components

This is another in a series featuring the views of owners of leading tool and die companies

by **JOHN D. DEWHURST**
President
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Wethersfield, Conn.
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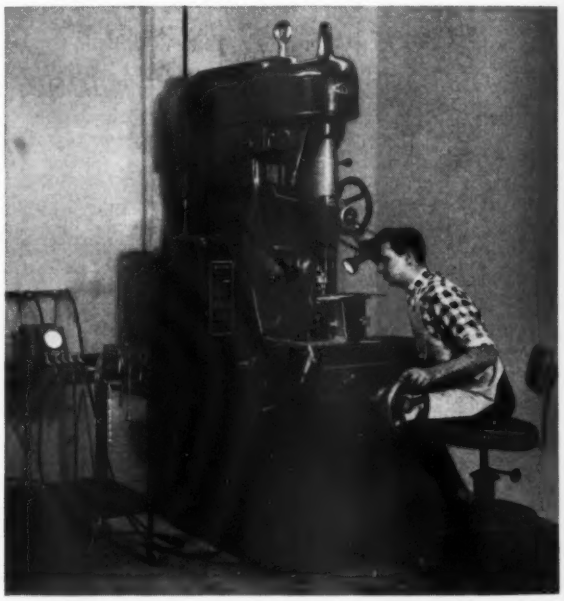

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CLEVELAND 14, OHIO

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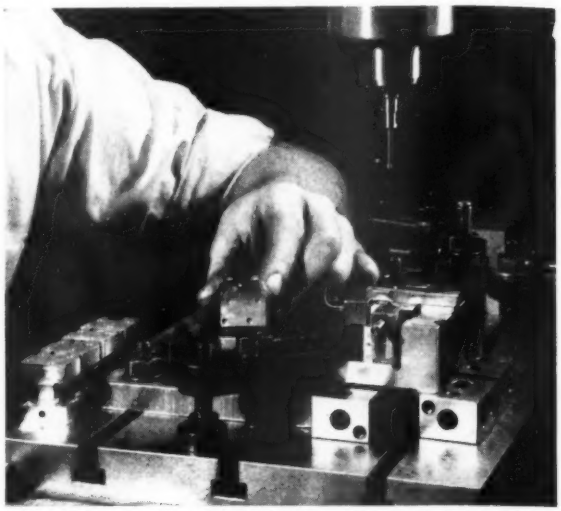

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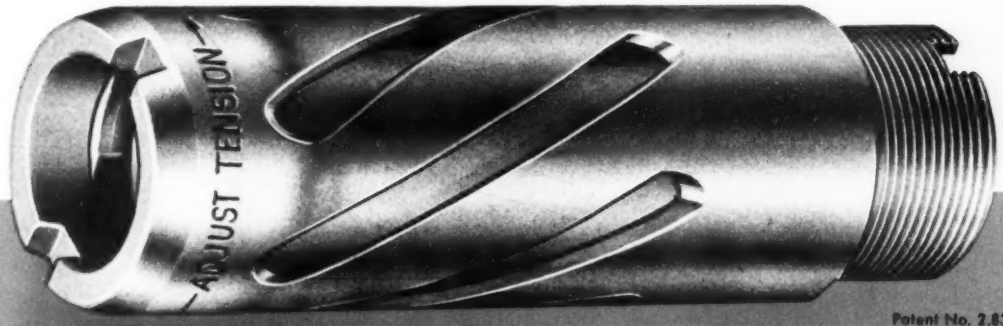

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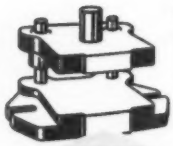

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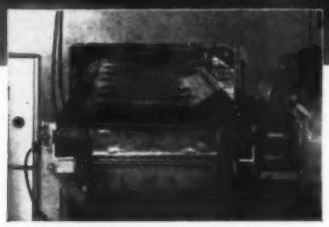

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CIRCLE INFORM-A-GRAM KEY NO. 10

Talk of the Month

CURRENT PROBLEMS IN MACHINE TOOL OBSOLESCENCE*

by K.C. Butterfield
Staff Master Mechanic
CHRYSLER CORPORATION
Detroit, Michigan

To elaborate on the title of this paper—"Current Problems In Machine Tool Obsolescence" — I should point out that we will be concerned with obsolescence as it is affected by current economic conditions and by recent technological developments and that the viewpoint will be that of users of equipment.

First, let us consider what has happened to the economic picture in the past year. Taken in total, 1957 was a good year for the nation. Over 5,980,000 new autos were sold, but by the year's end the backlog of unsold new cars was approaching an all-time high. And the situation worsened somewhat in the first three months of this year. The buying public just was not buying and autos provide an example of what was happening for all manufactured and consumer goods. Since the "why" of what brought on this so-called recession is not an important part of this discussion, suffice it to say there are now many indications we are pulling out of it.

Now, in what ways has this economic recession played a part in obsolescence of machinery? First, it should be considered that in many industries, and particularly in the automotive industry, a single year is a very appreciable percentage of the life of a particular machine. (As you know, many machines are obsoleted because of model or product change, which may occur at

* From the 22nd Annual Machine Tool Electrification Forum; sponsored by Westinghouse Electric Corporation.

any time.) Now the truth is that a lot of machines in this country will have been idled at least one calendar year before we are out of the recession. They are not necessarily obsolete—but they **are** surplus to present needs. What is being done about them? Through cause and effect, these machines are simply the stepchildren of the low production period. Since the parent corporations in most cases are taking steps to keep abreast of the productive scene, some of these steps can bring about obsoleting of these surplus machine facilities.

Generally, there are three ways in which this obsoleting may take place: (1) rearrange for lowered volume production; (2) rearrange—as part of a forward plan; and (3) replacement of over-age machines. Let's now consider these in some detail.

In the first case, it is only good business to rearrange plant facilities to make the most profitable use of the fewer machines needed for a lowered volume of production. Profits come out of getting the most from the machine—and maintaining quality while doing so. Most concerns having multiple production lines for a given product will idle the oldest and least productive line in times of low-volume requirements. If, as ofttimes happens, there are good and bad points in each line, naturally, the good features of each will be retained and by rearrangement of machines the best possible line combination made. This, then, will invariably result in a residue of machines not required for production, of older vintage and lesser capabilities. These surplus and obsolete machines might be held for a time but in the end would be disposed of in favor of newer, more up-to-date machines should future productive requirements necessitate their use. All of us can recall instances from personal experience where this type of realignment has occurred. In the auto industry, two very pertinent examples are brought to mind—the reduction of six-cylinder engine requirements as the public began to favor the V-8 engine and the cutbacks in the production of manual-type transmissions in favor of the automatic-type transmissions.

To consider the second manner in which obsoleting may take place, we find concerns ever ready to rearrange and replace equipment when by so doing they can become

. . . *Continued on Page 14*

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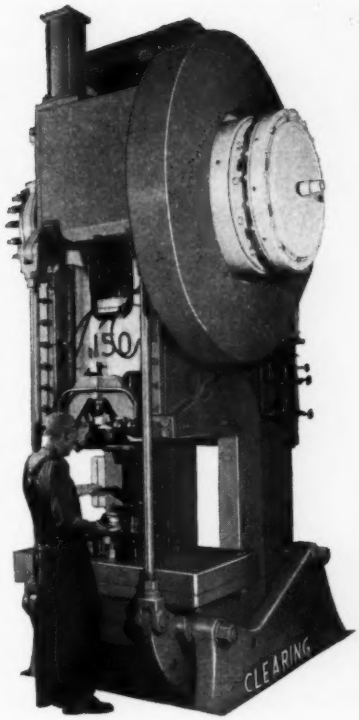
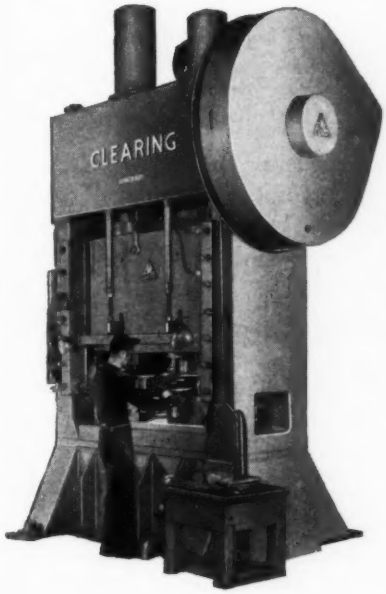
ASK RELIABLE MANUFACTURING COMPANY

When the backbone of your production depends on O.B.I.s, you want machines that you can rely on. That's why Reliable chooses Clearing's. As a contract stamping shop they need dependability and efficiency. Their O.B.I.s range from 75 tons to the 150 ton machine shown here. "Reliable", says Reliable, "That's Clearing."





CLEARING

SERIES-S PRESS SOLVES A TOUGH ONE AT TAIT

Heavy tonnage high up on the stroke—that's what Tait Mfg. Co. in Dayton, Ohio needed to draw stainless steel pressure vessels. The solution was this 250 ton double crank press with a 500 ton drive. Accurate, dependable operation without troublesome maintenance. That's typical of the Clearing Series-S press. Want details and catalog? Just write.

CMC

CLEARING PRESSES

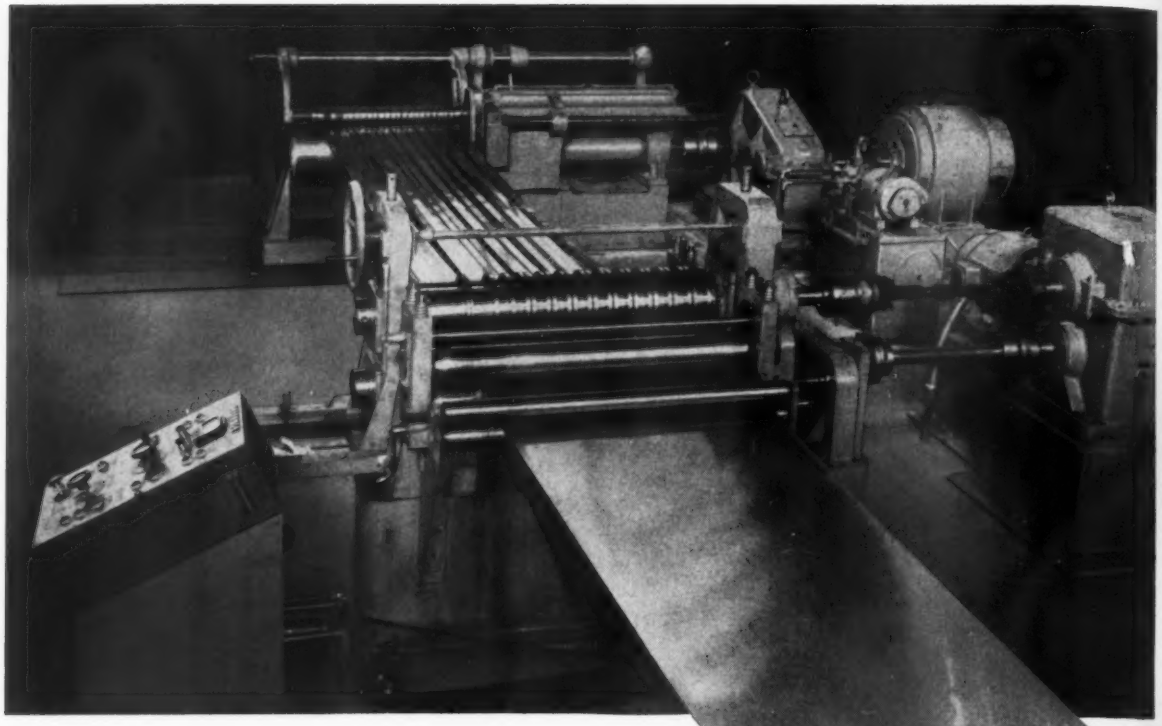
the way to efficient mass production

CMC

CLEARING MACHINE CORPORATION *division of* **U.S. INDUSTRIES, INC.**

6499 W. 65th Street—Chicago 38, Illinois / Hamilton Division, Hamilton, Ohio

CIRCLE INFORM-A-GRAM KEY NO. 11



Greater Profit and Operational Flexibility with a YODER SLITTER

Even if you use less than 100 tons of varied strip sizes per month, it will pay you to investigate the savings that are possible through the operation of a Yoder slitter. Savings per ton increase rapidly as coil size and width of strands decrease . . . so much, that under average operating conditions, a slitter will pay for itself in a few months.

From a small stock of standard mill-width coils, a Yoder slitting line enables you to meet unexpected demands, or to supply "special" width slit strands in a matter of a few hours. This flexible operation increases plant efficiency, resulting in savings of time and money through simplified production planning and greatly reduced strip inventories.

The Yoder line includes slitters of every size and capacity for coil or sheet stock. Send for the all-new, 1958 edition of the Yoder Slitter Book. It is a comprehensive text on the mechanics and economics of slitter operations with time studies, cost analyses, and other valuable data. Write to:

THE YODER COMPANY

5501 Walworth Avenue • Cleveland 2, Ohio

ENGINEERING **YODER** MANUFACTURING

ROTARY SLITTING LINES

PIPE AND TUBE MILLS (ferrous or non-ferrous)

COLD ROLL FORMING MACHINES

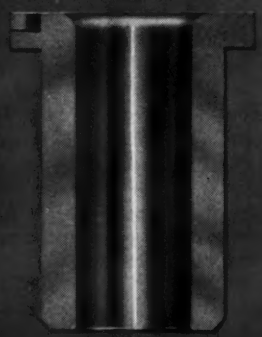
"Visit Booth 2770, Metal Show, Cleveland, Ohio, October 27-31"

CIRCLE INFORM-A-GRAM KEY NO. 12

you get close tolerance drilling with UNIVERSAL DRILL BUSHINGS

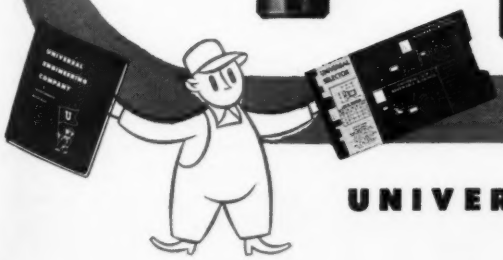
Accurately machined bushings are essential when drilling to close tolerance. UNIVERSAL DRILL BUSHINGS, of finest quality steel, are carefully tested for 100% concentricity and hardness, assuring pin-point accuracy and uniform quality. To prevent tool hang-up and breakage, each bushing has a blended radius on the top inside diameter.

All bores are superfinished. This superfinishing of bushings is important, especially in close tolerance work, because it reduces both tool and bushing wear to a minimum. Knurled head gives a quick, sure grip.



We stock drill bushings in all standard sizes and lengths at each of the following offices—Universal Engineering Sales Co., 1060 Broad St., Newark 2, New Jersey; 5035 Sixth Ave., Kenosha, Wis., and at our home office in Frankenmuth. Contact the nearest office for immediate delivery.

The Universal Drill Bushing Slide Chart gives accurate engineering data for the selection of all types and sizes of drill jig bushings up to 1¾" drill size. You may have one—free—by requesting on your company letterhead. At the same time, get your copy of our new catalog that describes all of UNIVERSAL'S products including chucks, tool holders, boring bars, bushings and index plungers.



UNIVERSAL ENGINEERING COMPANY

FRANKENMUTH 8, MICHIGAN

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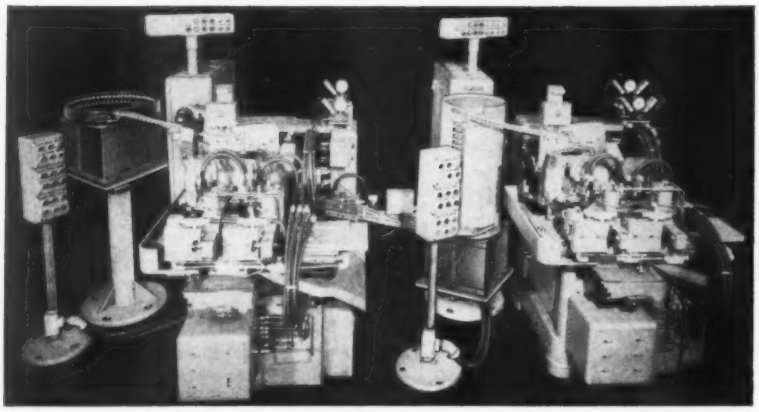
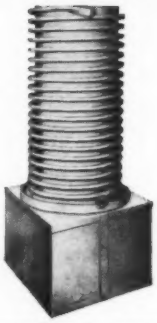
CIRCLE INFORM-A-GRAM KEY NO. 13

SYNTRON Transfer & Storage

PARTS FEEDERS



Receive, store, orient and discharge parts at controlled rates from one operation to another



SYNTRON Transfer & Storage Parts Feeders are designed to reduce costs and increase production — eliminate tote box storage and manual handling of parts — save valuable floor space.

SYNTRON Transfer & Storage Parts Feeders provide the automatic link between processing operations. They automatically receive, store, orient and transfer parts at a controlled rate from operation to operation. Parts may be conveyed up or down Spiral as required.

The Electromagnetic drive provides long, dependable service with low operating and maintenance costs.

Check the advantages of SYNTRON Transfer & Storage Parts Feeders in your operation. Our engineers will be glad to discuss their application with you.

MW858

Products of Proven Dependable Quality

Syntron can help you with problems involving . . .

Vibrators (bins, hoppers, chutes)	Rectifiers (Silicon and Selenium)
Vibratory Feeders	a-c to d-c Selenium Rectifier Units
Vibratory Screens	Electric Heating Panels
Shaker Conveyors	Electric Heating Elements
Vibratory Elevator Feeders	Sinuated Wires
Weigh Feeders	Shaft Seals
Packers and Jolters	Electric Hammers
Hopper Feeders	Concrete Vibrators
Lapping Machines	Paper Joggers

Syntron Sales and engineering service is available from 36 representatives throughout the United States. Take advantage of their willingness to work with you.

For more information write for complete catalog . . . Free

SYNTRON COMPANY
341 Lexington Avenue Homer City, Pa.

CIRCLE INFORM-A-GRAM KEY NO. 14

. . . Month's Talk from page 11

more competitive in their field. This will be accomplished according to a well-developed, forward-moving plan. This can be done during reduced-volume periods if planning for and setting aside the necessary funds has been done during the more profitable high-volume period. This thinking, of course, extends further than machines—it may encompass entire production facilities, building and plant site as well.

Lastly, there are undoubtedly thousands of machines which will be replaced this year because they're "just plumb worn out." Again, if funds are available from more profitable years, this replacement can best be made in a year of low-volume requirements, such as the one we are now experiencing. Obviously, when a machine is worn out—practically held together with baling wire—management should be so apprised and a replacement plan developed. Many a technological development has been made in the last year that will help in stating a case to management.

And so it would seem that a great many machines will become obsolete in the nation this year. In the automotive industry alone, in the years 1954, 1955 and 1956, over $80,000,000 of machine tools became obsolete. Proportionally, 1957 undoubtedly equaled these years. To the machine tool industry, this means opportunity to make sales of new machines.

Turning now to obsolescence as it is affected by technological improvements made by the machine tool industry, it is obvious that 1957 was outstanding from the standpoint of new developments. Certainly, the bulk of credit for this goes to machine tool builders, who have burned much midnight oil to determine how new things might be done to achieve their engineering. However, speaking as a user and in behalf of other users, may I say that we have also played an important part. We have created the needs for these better and improved machine tools and we have steadily insisted on a faster way, a more accurate way, a more safe way, and a way requiring less physical labor. We users take pleasure in being the stimulus to greater achievement. On the other hand, I am also forced to say that in the last year or two we've both made mistakes, costly mistakes, which will be discussed a bit later.

What advances have been made in the last year in machine tools?

. . . *Continued on Page 17*

at DE VILBISS

New design Brown & Sharpe Automatic Screw Machines

save up to 92% in production time

How much better production can you get from new design B&S Automatics? The De Vilbiss Company now has comparison figures on a wide variety of jobs transferred from old machines to new No. 00 Automatics. Each job shows production greatly increased over that obtainable with previous equipment. In many cases — one, two, and sometimes three secondary operations have been eliminated, ending the need for the extra machines previously required.

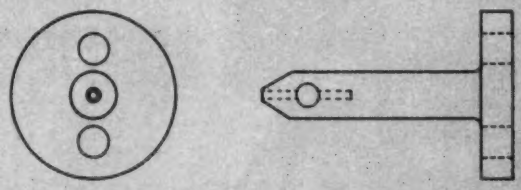
The man hour savings for some parts run as high as 92%. Along with these gains, the new No. 00 Automatics maintain the closest tolerances for size and concentricity, and meet the highest standards for surface quality.

Figure the comparable savings you can make, in your operations, with the extra speed, precision, adaptability — the easier setups and extended tool life you get with new-design B&S Automatics. You'll see why so many buyers say, "They pay for themselves, in record time." For complete details, write: Brown & Sharpe Mfg. Co., Providence, R. I.

Production time saved — 328 hrs.

Part	Quantity per run	Material
Nozzle Cleaner Body	18,560 pcs.	11/16" dia. Brass

With previous equipment	Production time — all operations	With new design No. 00
357 man hrs.	91% SAVING	29 man hrs.



on new B&S No. 00 Automatic with

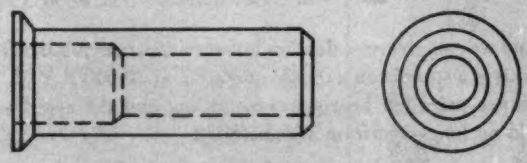
Special Offset Drilling Att. (2) Revolving Turret Drilling Att. Cross Drilling Att. Spindle Brake Burring and Drilling Att.

Cutting RPM	Sec. per piece	Pieces per hr.
7200	10	360

Production time saved — 71 hrs.

Part	Quantity per run	Material
Valve stem tail piece	11,675 pcs.	7/64" dia. Brass

With previous equipment	Production time — all operations	With new design No. 00
77 man hrs.	92% SAVING	6 man hrs.



on new B&S No. 00 Automatic with

Burring and Drilling Att.

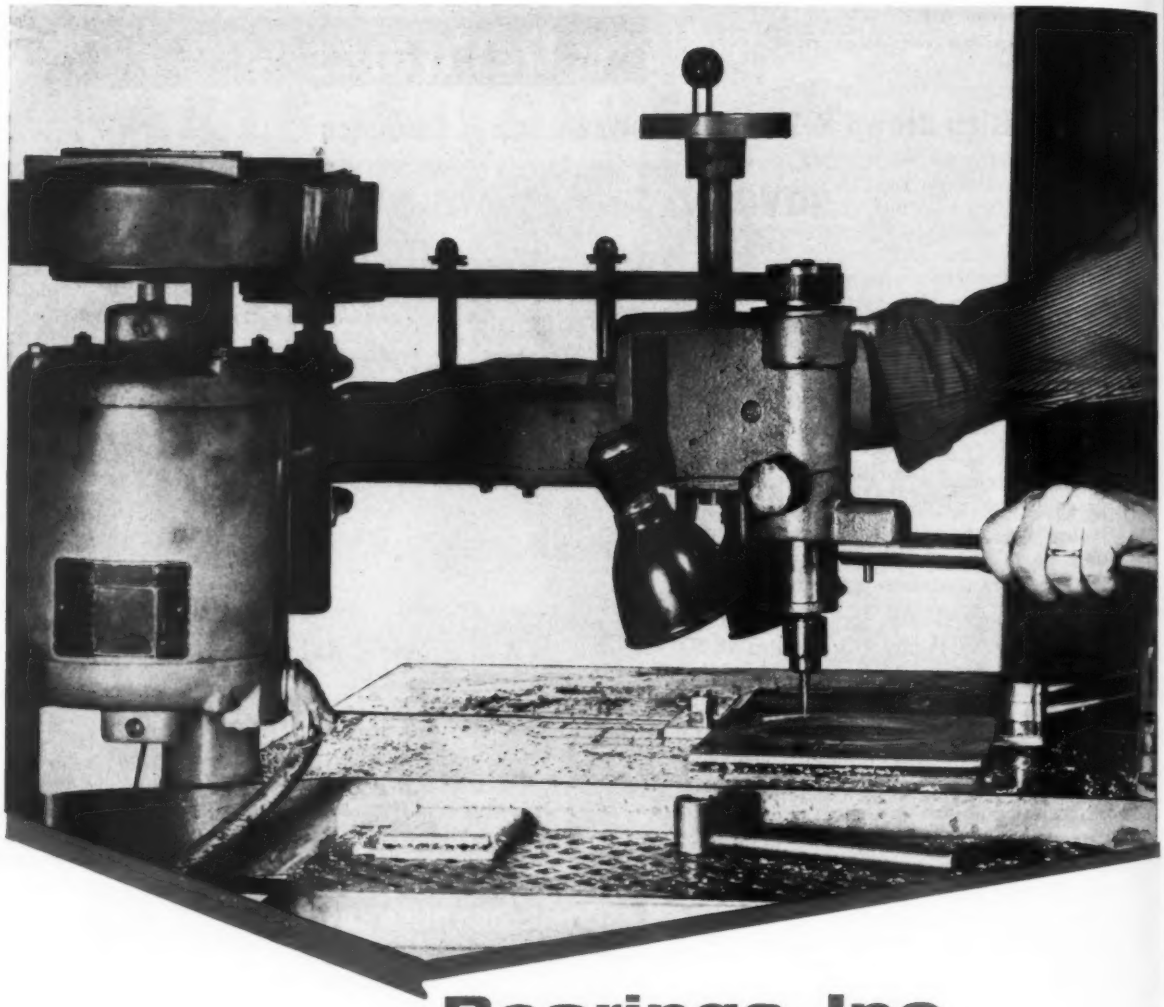
Cutting RPM	Sec. per piece	Pieces per hr.
7200	3½	1026

PROGRESS IN PRECISION FOR 125 YEARS

Brown & Sharpe

MILLING, GRINDING, AND SCREW MACHINES • MACHINE TOOL ACCESSORIES • PRECISION TOOLS • HYDRAULICS • CUTTERS

CIRCLE INFORM-A-GRAM KEY NO. 15



Bearings, Inc.

repaired, serviced and returned this high speed spindle in just 48 hours!

—And we can give *you* this kind of service when you need it! This is a spindle on a router operating at 10,000 R.P.M. Its super-precision bearings were failing and the spindle would no longer perform satisfactorily.

Our customer is located in Mansfield, Ohio, and at 10 a.m. on a Sunday the spindle was placed on a bus headed for Cleveland. The Bearings, Inc. Spindle Repair Department in Cleveland met the bus and work began immediately to bring this spindle back to its original accuracy and operating efficiency. The customer received the completely overhauled spindle the following Tuesday. Repair and transportation time—less than 48 hours!

Bearings, Inc. complete Spindle Repair Department is another service we offer our customers and all high speed grinding and precision bearings repaired by us will be returned to you, not in weeks *but in hours*—A service time you won't find equalled anywhere! Write or call our branch nearest YOU.

Providing bearing service in the North → **BEARINGS, INC.**

OHIO: Akron • Canton • Cincinnati • Cleveland • Columbus • Dayton • Elyria • Hamilton • Lima • Lockland • Mansfield • Toledo • Youngstown • Zanesville
INDIANA: Ft. Wayne • Indianapolis • Muncie • Terre Haute • **PENNSYLVANIA:** Erie • Johnstown • Philadelphia • Pittsburgh • York
WEST VIRGINIA: Charleston • Huntington • Parkersburg • Wheeling • **NEW JERSEY:** Camden
NEW YORK: Buffalo, Balanrol Corp. • **MARYLAND:** Baltimore • **DELAWARE:** Wilmington

and

in the South → **DIXIE BEARINGS, INC.**

FLORIDA: Jacksonville • **GEORGIA:** Atlanta • **KENTUCKY:** Louisville • **LOUISIANA:** Baton Rouge • New Orleans
N. CAROLINA: Charlotte • Greensboro • **S. CAROLINA:** Greenville • **TENNESSEE:** Chattanooga • Kingsport • Knoxville • Nashville

CIRCLE INFORM-A-GRAM KEY NO. 16

... Month's Talk from page 14

Well, if I were asked which was the most important single development, I would make the following nomination: It is this, that during 1957 the technique of tape-controlling machinery came of age and during the year many machines built by many different companies were marketed. This, I feel, is an outstanding contribution by the machine tool builders and the manufacturers of control equipment.

A comparable development is a punch-card-controlled bolt-circle drilling machine developed for use in manufacture of jet engines. High accuracy is obtained and over 300,000 positions of the table are available from any starting point. A third development is adaptation of tape control to a boring machine. Further, this particular machine is also equipped with tracer control to enable profiling or contouring in any two dimensions at a time. When return to normal boring is desired, the change is accomplished by changing pendants—a single operation done by removing and changing three pull-type electric plugs. Other adaptations of tape controls are many; however, the ones just described are illustrative.

Now let us look at some other machine developments: A new and different concept in in-line transfer machines gives consideration to machining three basically different intake manifolds in the same machine. This is a concept that might be expanded farther. It is an effort to reduce the high degree of specialization in one machine.

Moving to the press industry, a modular-type stamping press has four crowns, four slides, four beds and five uprights. More than 50 feet long, it is equipped with a through press feed. Changes in product do not mean machine obsolescence, since changing combinations can be worked out of beds, crowns, uprights, and slides.

Another breakthrough in the press industry involves moving bolsters for presses. In this type of machine, the next die to be run is placed on a bolster outside the press, and when ready, the bolster with die which has just finished production is disconnected, run outside the press, and the new die complete with bolster moved in and connected. Die changes with this method can be accomplished in minutes where formerly hours were required. Most major press builders can now supply this equipment.

Over the last few years much discussion has involved the merits of grinding versus other machining methods, as particularly applied to cast iron. One answer to this question is a continuous transfer-type grinder carrying parts on one pass through a roughing and finishing head. This type of machine can find many uses; it, too, was a development during 1957.

The developments just mentioned are cited only to illustrate trends which characterized this past year. Many other items and/or accessories might have been included as well.

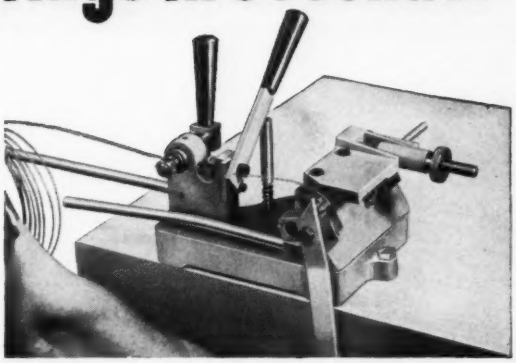
After a review of technological accomplishments of the past year in machine tools, let us see how this will affect obsolescence. Usually a new machine is brought out with a certain specific application in mind. We all know what happens; we all think our operation has the same requirements as the other fellow's. This is only a natural reaction and usually does have some reasoning behind it. But too often it's like little Judy who was entirely happy with her doll until her little friend received a doll with eyes that open and close. Since

... *Continued on Page 22*

Make springs in seconds!

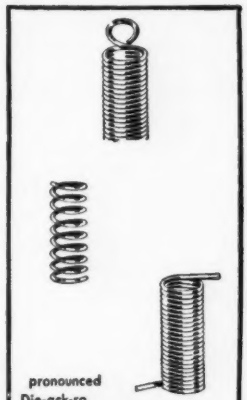
Save costly special orders

WITH THE **NEW**



DI-ACRO Spring Winder!

This unique machine eliminates costly special spring orders, saves valuable waiting time. Winds compression and extension springs to 1½" O.D. Handles round, flat and rectangular wire to ⅛" dimension. Note exclusive features in the hand operated Di-Acro Spring Winder which assure accurate tension and fast operation without special experience or skill.



pronounced Die-ack-ro

NEW TENSION CONTROL—Simply adjust to desired tension —the control keeps it uniform, for winding one spring or hundreds, and releases when each spring is wound.

NEW WIRE CUT-OFF DEVICE—After spring is wound, release tension and use cut-off lever to quickly cut spring to desired length.

NEW CAM LOCK—Simply feed wire under cam, turn handle and wire is securely locked to arbor while spring is wound. No threading required.

FREE ENGINEERING SERVICE

Send us your spring forming problems—samples or dimension sketches—together with sufficient test material, and let us wind some sample springs for you free of charge. No obligation.

See Di-Acro Machines in operation at Booth No. 260 Nat'l Metal Exposition Oct. 27-31 Cleveland

di-acro PRECISION METALWORKING MACHINES

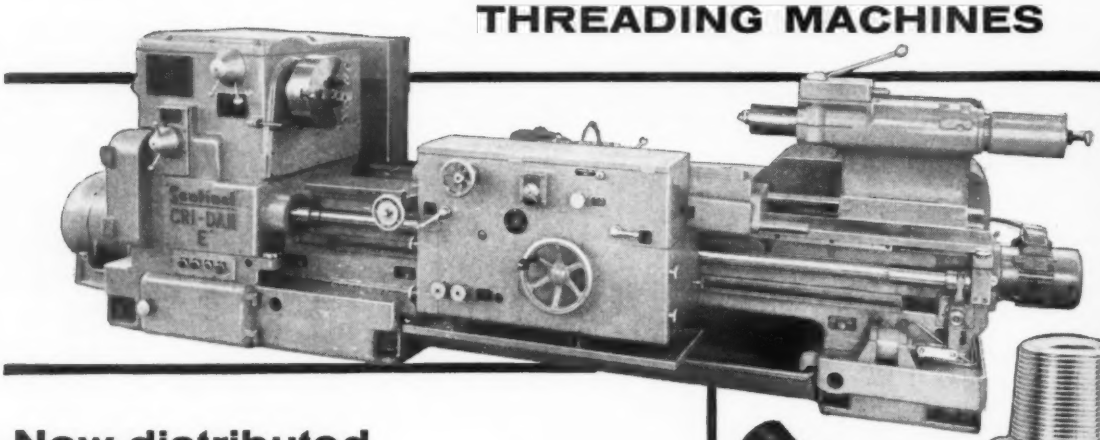
O'NEIL-IRWIN MFG. CO. • 315 8th Ave. • Lake City, Minn.

CIRCLE INFORM-A-GRAM KEY NO. 17

Announcing...

CRI-DAN

(Semi-Automatic Single Point)
THREADING MACHINES



Now distributed in the United States by GISHOLT

Widely used throughout Europe and rapidly gaining favor in the U.S.A., CRI-DAN High-Speed Threading Lathes offer outstanding advantages on a wide variety of threading work. Using single-point carbide tools and positive, cam-controlled movements, CRI-DAN provides very accurate lead and thread form on all types of internal and external threads, including multiple-start, coarse, fine, left- or right-hand, parallel or taper, with metric or inch pitches. Highest production, accuracy and fine finish are assured on even the most difficult materials.

With simple operation and 15 minute change-over, CRI-DAN is an extremely versatile machine capable of handling an amazing range of components at high production rates. Single-point carbide tools, easily resharpened or replaced, cut tooling costs to a minimum.

Two models are available with a full complement of accessories to meet your needs. Ask your Gisholt Representative for full details or write

GISHOLT MACHINE COMPANY

Madison 10, Wisconsin

Turret Lathes • Automatic Lathes • Balancers • Superfinishers
Threading Machines • Packaging Machines
Masterglas Molded Plastic Products

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First in the WORLD OF WHEELS *for every grinding purpose*

Throughout industry Norton abrasives are the most widely used, most highly prized . . . with long leadership in improving product qualities and profits to give you the true "Touch of Gold".

Around the world and still expanding

Abrasive and Grinding Wheel Plants — Worcester, Mass.; Santa Clara, Calif.; Hamilton, Ontario; South Africa; England; France; Germany; Italy; Brazil.

Behr-Manning Plants — *Coated Abrasives and Pressure-Sensitive Tapes* — Troy, N.Y.; Canada; Australia; France; Northern Ireland; Argentina; Brazil.

Electric Furnace Plants — Huntsville, Alabama; Chippawa, Ontario; Cap-de-la-Madeleine, Quebec; Brazil.

Grinding and Lapping Machine Plant — Worcester, Mass.

Refractories Plant — Worcester, Mass.

Electro-Chemical Plants — Chippawa, Ontario; Huntsville, Alabama.

Norton Pike Plant — *Sharpening Stones* — *Stair and Floor Tile* — Littleton, New Hampshire.

Bauxite Mines — Bauxite, Arkansas.

General Offices: Norton Company, Worcester, Mass.

Headquarters for the "TOUCH of GOLD"

The world's largest source of abrasive research, manufacturing development, and service . . . all combining to aid your own production with improved grinding at lower cost.

BIG STEPS FORWARD Some of the latest and most important Norton developments—from top to bottom: a 32 ALUNDUM G-bond wheel, providing a unique aluminum oxide abrasive of outstanding performance plus the most advanced vitrified bond ever developed for precision, and semi-precision grinding . . . ALUNDUM TUMBLEX "S" bonded spheres for barrel finishing—spheres that get into areas where other shapes can't reach . . . A 44 ALUNDUM wheel, the most sensational non-premium abrasive ever developed for economical grinding — both rough and precision. Advancements like these are typical of the more than 200,000 different types and sizes of Norton abrasive products that cover every modern grinding job.

SELECTION IN ACTION For ordinary grinding jobs the vast amount of Norton know-how literature tells you how to select exactly the right wheels, while the many Norton films show the best grinding methods. But you may have new, unusual problems. Then, your distributor's Norton factory-trained specialist by studying your jobs can help you find the right solutions in quick time. And if necessary, he'll call in your regional Norton Abrasive Engineer for additional technical advice. With experts like these, the grinding wheels you need will be proved in action—on your machines.

DISCOVERING MUCH MORE Norton laboratory researchers, numbering over 180 scientists and technicians, are constantly seeking to find out a great deal more about abrasives and grinding wheels. Their chief interest is in developing new abrasives, new abrasive products and improved grinding techniques. Their many successes in research of this nature have stepped up grinding progress to lower your grinding costs.

THE RIGHT WHEELS ARE RIGHT AT HAND Your Norton distributor is careful to keep his stocks fully adequate to meet all needs of his area. That's true, too, of the stocks in the five big, strategically located Norton branch warehouses — in the Norton California plant — and of the gigantic stocks at Worcester in "Norton City" — the world's largest grinding wheel plant, Headquarters of the "Touch of Gold."

NORTON ABRASIVES

Making better products . . . to make your products better

NORTON COMPANY • WORCESTER, MASS.

District Offices: Chicago* • Cleveland* • Detroit* • Hartford • Los Angeles Area (Huntington Park) • New York Area (Teterboro, N.J.) • Philadelphia* • Pittsburgh* • St. Louis

**Warehouse Facilities and Stocks at this location*

Plants and distributors around the world

BEHR-MANNING CO., Troy, N.Y. is a division of Norton Company

NORTON PRODUCTS
Abrasives • Grinding Wheels
Grinding Machines • Refractories
Electrochemicals

BEHR-MANNING DIVISION
Coated Abrasives • Sharpening Stones
Pressure-Sensitive Tapes

4-58

NEW! ULTRA-MODERN 45-TON OBI

added to Niagara's exclusive front-to-back crankshaft series

READY FOR YOU

. . . a brand new addition to industry's most advanced line of OBI's! Years ahead of any press within its range, this 45-ton newcomer is available plain or geared. The front-to-back arrangement of its 3½" crankshaft is, of course, a distinguishing mark of Niagara's famous Series E.

No other OBI press design has been so widely acclaimed. And no wonder . . . for no other OBI boasts so many unique advantages:

Full support to wide dies. Greater resistance to off-center loading. Accurate alignment of slide with minimized tendency to cock. Crankshaft deflection minimized. Substantially increased die life. Smoother, safer performance. Exposed overhanging gears, flywheel and other mechanisms eliminated. Less floor space.

GET THE FULL STORY on this new 45-ton wonder-worker as well as the 4 other sizes in the Series E family (up thru 200-ton capacities, and 7½" shaft diameters, standard and automated models). Write for illustrated Bulletin 56.

NIAGARA MACHINE & TOOL WORKS, BUFFALO 11, N. Y.

- Rigid crankshaft with close coupled main bearings each side of crank pin.
- Widest spaced OBI gibbing (L to R) in the industry permits wider box section slide to rigidly support a greater slide face area of full JIC dimensions. Guiding of slide is closer to point of die operation because there is no flange interference with gibbing.
- Longest gibbing in the industry, exclusive multiple "V" type, provides the most efficient guiding and accurate alignment of slide for greatest die life.
- Fully concealed, yet readily accessible, driving mechanism.
- Enclosed, rigidly supported gearing operates in sealed oil bath.
- Low inertia, pneumatic friction clutch and brake operate directly on crankshaft — the slowest rotating shaft.
- Precision, hardened, longer-wearing steel gears.
- Rigid, compact all-steel, box type frame.
- Power slide adjustment and power inclining device operate with new, unequaled speed.

NIAGARA

OBI PRESSES SERIES E

DISTRICT OFFICES: Boston • Buffalo • Cleveland • Detroit • Indianapolis • New York • Philadelphia / Distributors in principal U.S. cities and major foreign countries.

CIRCLE INFORM-A-GRAM KEY NO. 21

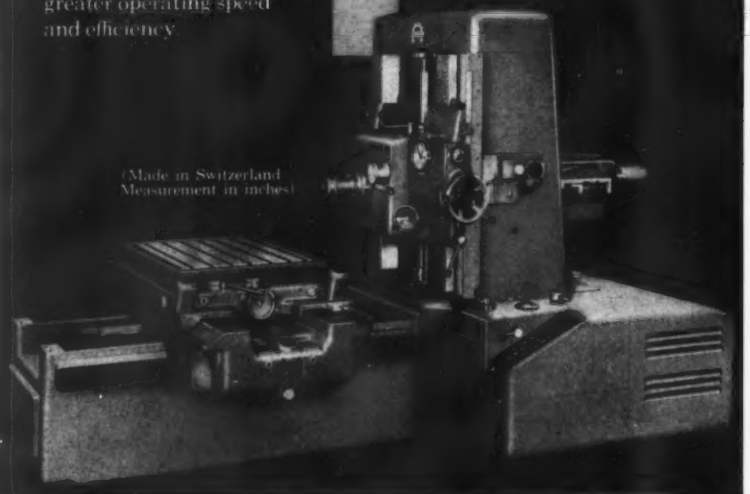
ACCURACY + VERSATILITY

the DIXI 75 gives you horizontal optical jig boring

- Projected optical setting—direct reading to .00005" for linear motions and 1 sec. of arc for built-in rotary table. Linear optics provided with adjustable zero reference.
- 3" diameter boring spindle
- Increased capacity: table size 39¾" x 32"; 29⅝" cross travel; 23⅝" longitudinal travel; 25⅝" vertical travel

PLUS...

- Automatic positioning device available.
- Simplified controls functionally arranged for greater operating speed and efficiency
- Hydraulic feeds and infinitely variable spindle speeds.
- Rear support optional.



(Made in Switzerland
Measurement in inches)

MBI has engineers available for consultation, guarantees service by factory trained staff, and stocks spare parts in New York. — Join the long list of leading aircraft and manufacturing plants throughout the United States which are using the horizontal optical jig borer.

See the Dixi 75 for the first time in U.S.A. in operation at booth 2144, National Metal Exposition, Cleveland, October 27-31.

MBI

M. B. I. EXPORT & IMPORT LTD.

A DIVISION OF MACHINERY BUILDERS, INC.
475 Grand Concourse, Bronx 51, N. Y.

"Over 25 years' experience in designing and building machinery."

CIRCLE INFORM-A-GRAM KEY NO. 22

. . . Month's Talk from page 17

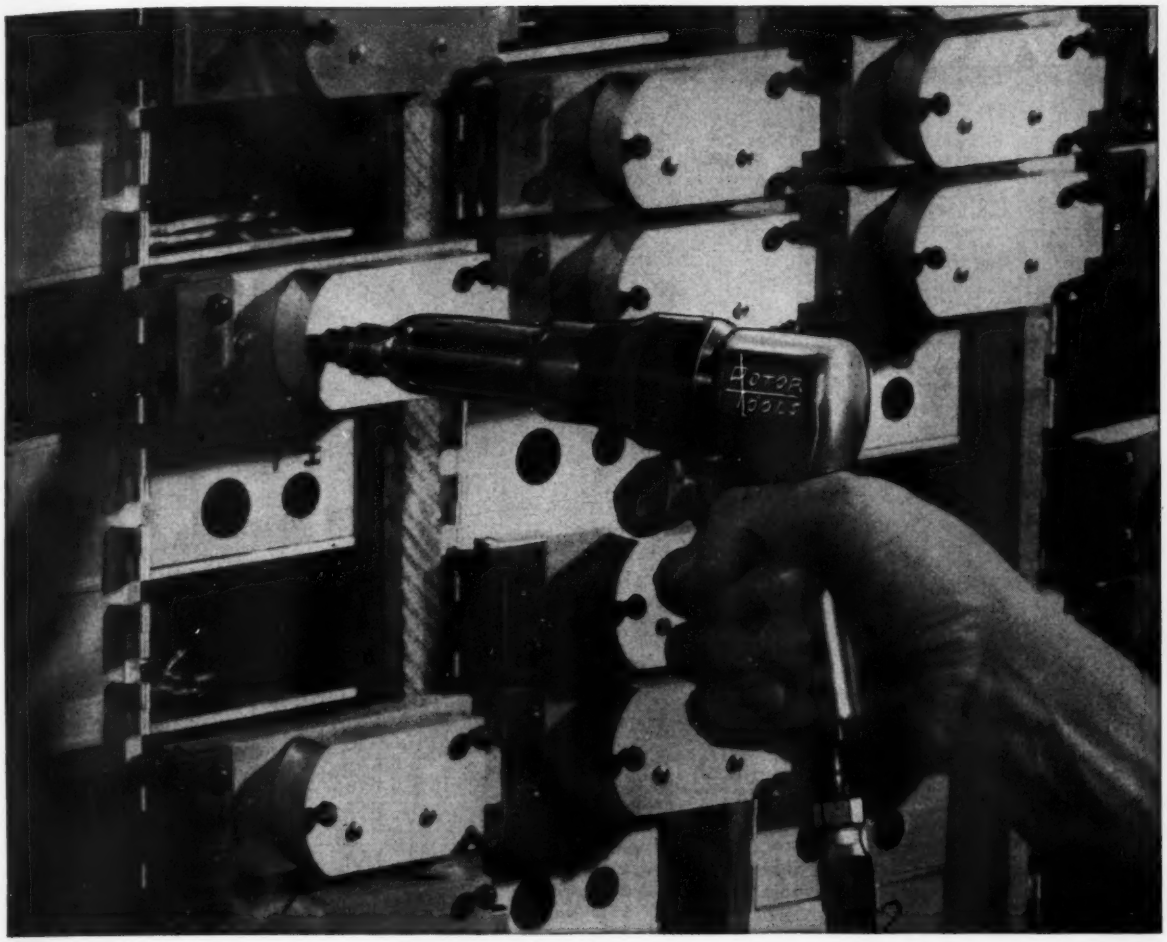
Judy's doll's eyes didn't open and close—well, you can guess there wasn't much peace for the family. There is a point to be made here—a warning to users of machine tools: Don't be fast-led into a new and fancy machine. Instead, demand that the machinery salesman prove—and then have your financial people confirm—that the new machine will make you money over and above what you have now. Do this *before* you sign the requisition and *before* you obsolete your present facility.

Users of machine tools should bear in mind that the machines acquired in recent years vary greatly from earlier acquisitions. In a constant trend toward a greater degree of automation, machinery has become increasingly specialized. As specialization increases, adaptability to model or product change has decreased and thereby early obsolescence may be necessary.

At last year's conference Ford Motor's J. F. Randall presented the building-block concept of in-line transfer machines. Here, the Ford people visualized interchangeable standard components that would eliminate some of the difficulties of adaptability to model or product change and to decrease obsolescence. In the last year, as many of you know, an informal committee of Ford, Chrysler, and General Motors representatives have been polling the manufacturers of equipment of this type to determine the standardization plans of each, and to ascertain the feelings of each toward certain standard dimensions for establishing interchangeability. It was emphasized that the standards proposed would not in any way detract from a builder's individuality of design and construction. At this time, we can report that 26 major builders have been individually contacted and that 26 have agreed to go along with the program. Present standards of these builders are now being compared; it is expected that an early recommendation for industry standards will be made that will require minimum changes by all and a maximum of the desirable standardization.

What about automation during the last year or so? As we've already noted, there has been an increasing trend toward automation. In my own area this trend extends back some three or four years. I would say that today our people

. . . *Continued on Page 24*



Cuts screw-driving time 66%

APPLICATION: Rotor S-02 Air Screw Drivers on vault assembly job *paid for themselves in 8.6 weeks.* **RESULT:** Time per unit with former hand screw drivers was 13 seconds. With the 2000 rpm S-02 PRC, it is 4.4 seconds.

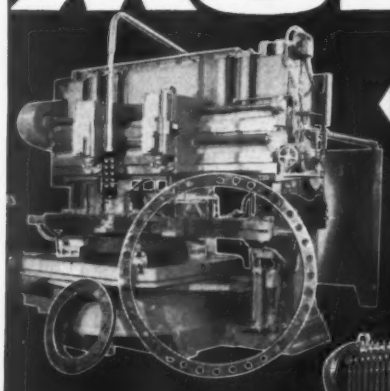
Rotor S-02 screw drivers and nut setters are available with three types of drives, with reversible or non-reversible motor, lever or pistol throttle, and with long or short angle head (with six different spindles). At least three speeds for each model. All models are quieter. Ask for a demonstration on your job. Bulletin 46 free on request. The ROTOR TOOL Company, Cleveland 32, Ohio.

Rotor Air Tools: Assembly Tools • Drills • Small Wheel Grinders
Straight Grinders • Vertical Grinders • Scalers • Chippers • Rammers
Rotor High-Cycle Electric Tools: Grinders • Polishers • Sanders

ROTOR TOOLS®
CLEVELAND, OHIO

CIRCLE INFORM-A-GRAM KEY NO. 23

MOLINE



HD68 drills bolt circles from 12" to 100" diameter. Each of the two spindles has capacity for 2½" drill in steel. Operating cycle is fully automatic.

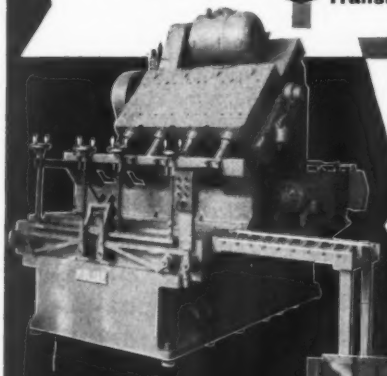
HD13 straight line-type drilling machine with capacity for thirty ¼" drills in steel. Used for work on heavy castings, round and rectangular steel tubes, structural shapes, plates and grader blade drilling or countersinking.

For Greater PRODUCTION . . . EFFICIENCY . . . SAVINGS

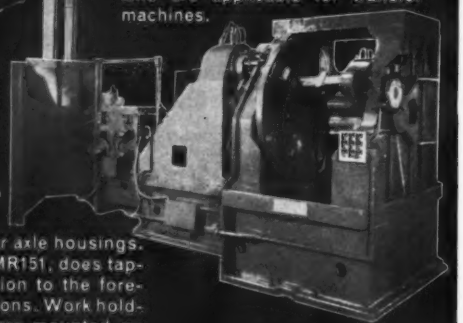
Use an individually designed "Hole-Hog" Machine Tool for such jobs as...

- Multi-Spindle Boring
- Single and Multi-Spindle Honing
- Straight Line Multi-Drilling
- Adjustable Spindle Drilling
- Vertical and Way-Type Fixed Center Drilling, Boring and Tapping
- Transfer-Type and Special Machines

OVER 57 YEARS OF MACHINE TOOL ENGINEERING EXPERIENCE IS AT YOUR SERVICE. TELL US YOUR PARTICULAR PROBLEM



13CB hydraulic feed cylinder boring machine. V-8 engine blocks are rough and finish bored for wet-type cylinder sleeves. Units of this kind are applicable for transfer machines.



MR152 performs drilling, reaming, spot facing and chamfering operations on tractor rear axle housings. A companion machine, MR151, does tapping in addition to the foregoing operations. Work holding fixtures are mounted on power driven trunnion.

MOLINE TOOL CO. MOLINE, ILLINOIS

MOLINE TOOL COMPANY
REPRESENTATIVES IN PRINCIPAL CITIES
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109

CIRCLE INFORM-A-GRAM KEY NO. 24

. . . Month's Talk from page 22

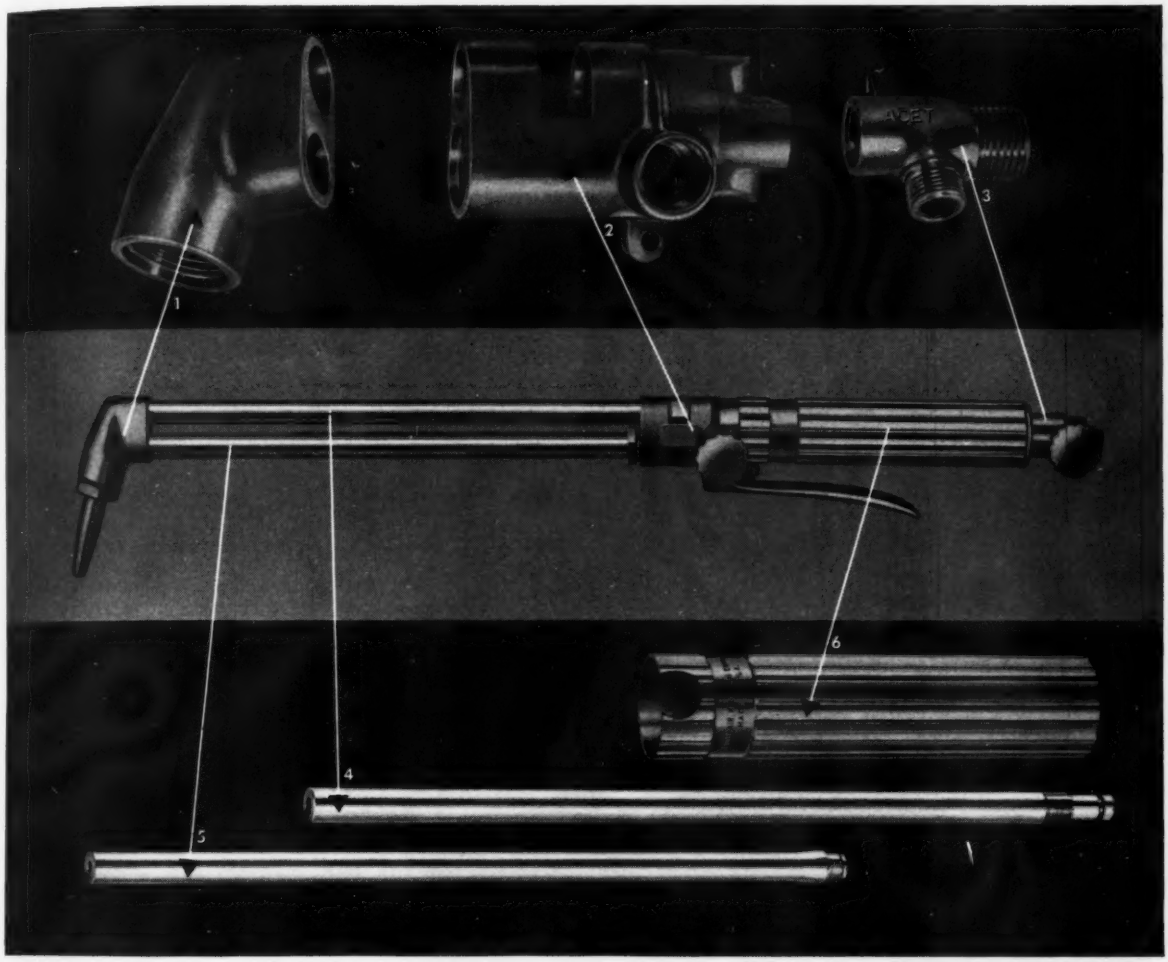
would take a good look at any new highly automated line. Certainly it would have to be justified in every way. Someone someday might write quite an article on the "Sad Side Of Automation." Many of us have been bitten or burned by a piece of automated equipment that just cannot be made to function within the characteristics and capabilities for which it was purchased. And the net result is early obsolescence. There's nothing quite so useless as a special automated machine that cannot be made to satisfactorily function. It certainly has no resale value; its worth is usually little more than its scrap value.

Usually it is the users who have made mistakes on automated equipment. And the mistakes made are easy to make. A good example might be to attempt automated assembly of components that have not been checked or sized. Another mistake—and one which the builders should partially shoulder — is overdone and unnecessary automating for which the only explanation is that we sometimes practice automating for automation's sake. When something like this occurs, it has an unhappy effect that we drop back to a process or technique that is old but tried and true. And, automation has received another black mark. It is better by far that we make our strides in automation a bit slower but more surely. In my experience, automation received a few black marks the past year. Admittedly, automation has a very big part to play in the manufacturing scene; we must make the most of it by using it right.

Now the job of technical development is not over—and, in fact, never will be. With the arrival of the space age and all its requirements, we're faced with this often-stated problem: How do we machine a bewildering variety of new super alloys with speed and accuracy? These problems are superimposed over those that the automobile and associated industries will face because of anticipated product developments, such as the combination rear axle and transmission and the free piston engine. The solution of these problems in new machine development will demand the best efforts of everyone, both builder and user. In review, 1957 brought many fine technological developments that will mean better, more profitable machines for the user and good sales prospects for the builder of machine tools.

SHORT CUTS to finished products.

Anaconda pre-formed mill products cut time and cost in finishing and machining—reduce scrap losses.



Linde Company's "Purox" Cutting Blowpipe, Type "E," is produced more easily and economically with these Anaconda products. **1, 2, 3.** Die-pressed forgings, with these advantages: twice-wrought metal has denseness to prevent gas leaks; toughness and strength to stand up to abuse; has uniformity, dimensional accuracy to cut machining cost—finishing reduced to bright dip. **4, 5.** Thick-wall tubes of Ambrac-850 alloy to dissipate heat rapidly, prevent overheating and "flashback"; alloy has high strength for rough service, yet has sufficient machinability. **6.** Special-shape brass tube with fluting pre-formed is furnished in long lengths ready for fast, economical screw machine operation.

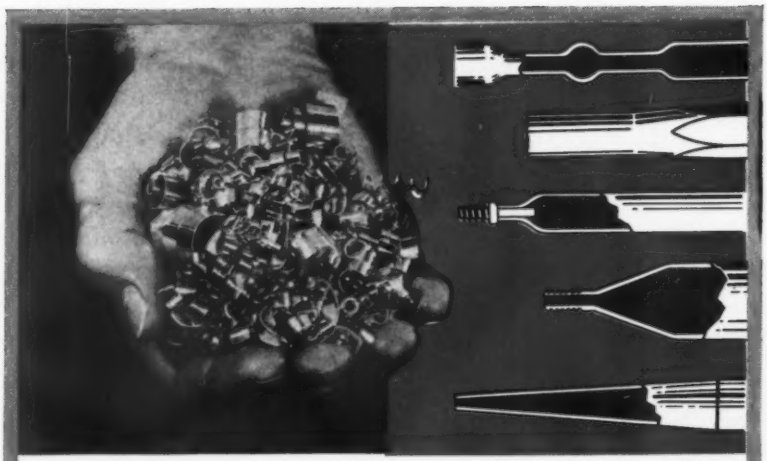
Cost-cutting possibilities are almost unlimited when imagination is applied to designing with pre-formed Anaconda mill products. Simplify costly built-up assemblies with die-pressed forgings. Cut machining and scrap with tubes and solid special shapes adapted to your needs. For imaginative and practical technical help, write: The American Brass Co., Waterbury 20, Conn. In Canada: Anaconda American Brass Ltd., New Toronto, Ont. 8849

DIE-PRESSED FORGINGS • SPECIAL-SHAPE TUBES
EXTRUSIONS • FABRICATED METAL GOODS

ANACONDA®

products made by
THE AMERICAN BRASS COMPANY

CIRCLE INFORM-A-GRAM KEY NO. 25



chips...or parts

Which are you paying for?

Fenn rotary swaging can have an important role in reducing the cost of your product . . . and making it better. This modern method of chipless part making is fast, versatile, accurate (to ± .001") . . . saves money and metal. Plenty of it! You save in capital investment, labor, material and time. Here's an example—A precision shaft was formerly made from a five piece assembly at a cost of $130.00. Now, swaged from tubing, it costs $20.00 . . . a savings of 85%. To be sure that you are not paying for chips instead of parts, look into Fenn Rotary Swaging. Write for catalog SM58.

FENN *Sets the Pace* IN ROTARY SWAGING

FENN MANUFACTURING COMPANY • 205 FENN ROAD • NEWINGTON, CONN.
CIRCLE INFORM-A-GRAM KEY NO. 26

MEN YOU SHOULD KNOW

New president of Koehler Aircraft Products Co., subsidiary of New Britain Machine Co., is **Richard M. Johnson.**

Engis Equipment Co. has announced the promotion of **Robert E. Reid** from assistant manager to general manager of its Hyprez Division. He will be in charge of all service to the division's distributors and customers.

Four executives promoted by The Sheffield Corp., a subsidiary of Bendix Aviation Corp., are **Jack T. Welch,** vice president in charge of field sales; **William I. Wilt,** vice president of the Gage and Instruments Division; **Victor J. Boll,** assistant vice president of the Contract Mfg. Division; and **Thomas W. Clark,** assistant vice president of the Service Facilities Division.

Personnel changes in the engineering department of the C. A. Norgren Co. include **Andres Zmuda,** chief engineer; **Morley V. Freidell,** supervisor of a newly-created Research and Development Section; **Ralph C. Baker,** engineering laboratory supervisor; and **Kirk Carlsten,** product design and drafting supervisor.

Bruce L. Mims, formerly chief engineer of The Barden Corp., has been elected vice president of engineering of the company.

Recently appointed chief engineer of the Colson Corporation's new Jonesboro, Ark., plant is **Harrison A. MacLeod.** He previously served as methods engineer.

Kenneth W. Meytrott is the new chairman of the board of Ettco Tool & Machine Co., Inc. He formerly served as vice president of the corporation.

Progressive Welder Sales Co. announces the appointment of **William T. Wilbur** as chief engineer in charge of its resistance welding and metals welding equipment lines, and **Stephen E. Jerome** to serve as factory manager, supervising manufacturing facilities at the Pontiac Division.

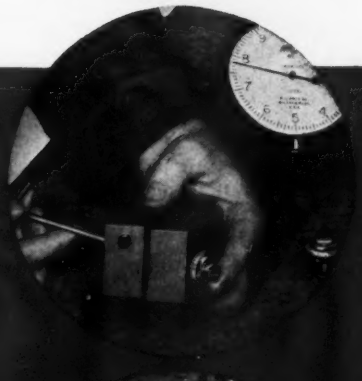
Appointment of **John Aldred** as chief engineer has been made known by Sherman Products, Inc. He will work with **H. F. Froehlich,** group manager responsible for the manufacturing, engineering, and purchasing-production control departments.

. . . Continued on Page 28

now, pre-set tools to accurate part dimensions outside the machine with this new Microbore® System

SIMPLE 4-STEP PROCEDURE

1. To set up pilot tool, insert Microbore "Pre-Set" unit in boring bar. Adjust to part dimension by trial cut and final setting using Micrometer Vernier adjustment.



2. Remove adjusted pilot unit from the boring bar and install in the standard Microbore setting block.

3. Position indicator arm on high point of pilot unit in setting block and adjust indicator to zero.

Eliminate trial cuts... change tools in seconds... simplify tool maintenance

Using a standard setting block and indicator, Microbore tools can now be pre-set to accurate part dimensions outside the machine and quickly locked in the boring bar or tool holder without further adjustment.

"Pre-Set" eliminates scrap parts due to trial and error set-up and greatly reduces down time for worn tool point adjustment. "Pre-Set" encourages the operator to keep sharp tools in the machine assuring greater accuracies and produces the maximum number of pieces per tool grind by minimizing breakage due to dull tools.

"Pre-Set" also makes it possible to replace worn tools without changing the entire boring bar or tool holder—eliminates the need for stand-by bars—simplifies tool grinding and maintenance.

Microbore System of "Pre-Set" tooling may be applied to boring, turning, facing and chamfering operations and is especially suited to production and automated operations where machines must maintain peak production on long runs. Write for complete information.

4. Adjust gage pin to same zero setting. Any number of additional tools may now be pre-set and interchanged with pilot for precision boring the same diameter.

If necessary to pre-set for depth of bore, tumble block to adjacent side and repeat procedure.

The DeVlieg Microbore System of Adjustable Precision Tooling includes Standard Microbore Boring Bars and Boring Bar Sets, Special Cluster Tooling, Flash-Change Tooling and Tool Holders, Flash-Change Replacement Bridgeport Spindles, Turret Lathe Turning Heads and Adjustable Boring Heads.

DeVlieg® Microbore® System

DE VLIEG MICROBORE • DIVISION OF DE VLIEG MACHINE COMPANY

Fair Street, Royal Oak, Michigan

CIRCLE INFORM-A-GRAM KEY NO. 27

Helping Leading Manufacturers Give You Better Machine Tools!

We at True-Trace are proud to be a part of and contribute to the above manufacturers' reputation in producing accurate, dependable tracer and numerically controlled machines–equipment that can be counted upon to produce the precision, complex parts so vital in today's metalworking industry. These leaders know they can depend upon True-Trace machine tool controls to do the best job. After complete investigation of various control systems available, they, with others, have selected True-Trace as original equipment.

When you think of new machinery for your plant expansion or modernization...look to these leaders for quality equipment you can count on. Or–if you're considering the conversion of existing manual machines to tracer or numerical control...do as the leading machine tool builders have done–specify True-Trace!

"More True-Trace Machine Tool controls are used as original equipment by more machine tool builders than all other control systems combined."

"Sponsor of the Contour Machining Conferences"

TRUE-TRACE SALES CORPORATION
9830 E. Rush St., El Monte 39, California
Branch Plants: 35 Urban Ave., Westbury, Long Island, New York
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Dealers in Principal Cities

CIRCLE INFORM-A-GRAM KEY NO. 28

. . . Men from page 26

Promotion of **I. Kirk Schlamp** to general manager of its Ravenna Metal Products Division has been announced by Standard Screw Co. He replaces **Kemp O. Hiatt,** who is retiring.

C. G. Bauer has been appointed director of the newly-created quality control office for Chrysler Corp.'s Automotive Manufacturing Group, under **L. I. Woolson,** corporation vice president and director of manufacturing services. **J. J. Wetzel,** previously quality control manager at Dodge Division, succeeds Bauer as director of the quality control office on the corporate manufacturing staff under **D. C. McCarthy,** acting director of the manufacturing staff. Other recent Dodge division promotions include **E. C. Shawe,** quality control manager, **R. C. Kobus,** manufacturing engineer, **C. E. Taylor,** plant engineer.

Recently appointed general manager of the Die Division of Clearing Machine Corp., Division of U. S. Industries, Inc., is **James L. Wheeler.**

Now serving as manager of the Truck and Big Mixer Section of the Worthington Corp. is **Graham Ross.** He is also manager of the Paver Section of the corporation's Plainfield Division.

Appointment of **Charles L. Long** to head the Project Engineering Dept. of Chainveyor Corp., has been announced. He will make his headquarters at the general offices in Los Angeles.

Organizational changes have been made known by Minneapolis-Honeywell Regulator Co. **George M. Muschamp** takes over as group vice president of engineering and **John M. Wilson,** former head of design and development, becomes director of engineering.

The manufacturing and technical activities of the Vulcanized Fibre Department of the Taylor Fibre Co. has been reorganized. **Kenneth M. Hayes,** former manager of sales promotion and training, was named manager of manufacturing activities; and **John R. Cunningham,** former overall department manager, assumes management of technical and quality control operations.

Hubert Fruehauf has taken over as manager of the new Magnesium Products Department of The Dow Chemical Co. He will be responsible for magnesium fabricating and semi-fabricating operations at the Bay City and Madison Divisions.

The Indianapolis Plant of Heppenstall Co. is now being managed by **Glenn F. Whiteley.**

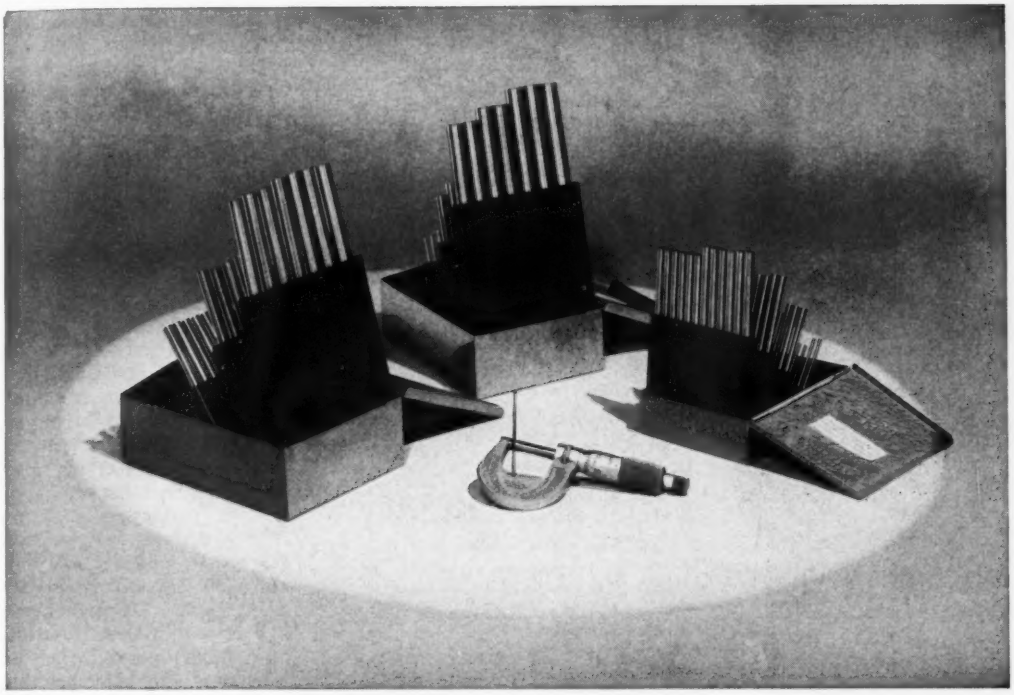
DRexel 6-4222

ESTABLISHED 1927

WILLIAM T. HUTCHINSON CO.

53 BROWN AVENUE SPRINGFIELD, NEW JERSEY

HUTCHINSON HSS BLANKS



115 Pieces – COMPLETE – .040" to .500" – $88.00

your choice of two tolerances
+ .0002" — .0000
or
+ .0000 — .0002"

JOBBER SET	LETTER SET	WIRE SET
$32.27	$29.03	$27.40
in Huot Index	in Huot Index	in Huot Index

HIGH SPEED STEEL — 64 "C" scale hard — gage tolerance — mirror finish. parallel ground

ANY DECIMAL DIAMETER OF STANDARD LENGTH .020" TO 1.000" SHIPPED ON 24 HOUR NOTICE

CIRCLE INFORM-A-GRAM KEY NO. 29

HIS JOB

....TO BUILD
YOUR PROFITS!

THE *Roto-Finish* CUSTOMER'S MAN

There's nothing unique about stressing product quality. But, at Roto-Finish we have an added incentive. The success of the Roto-Finish Customer's Man *depends* on providing the kind of dependable, mass-production finishing service which builds customer satisfaction, and results in a steady repeat business.

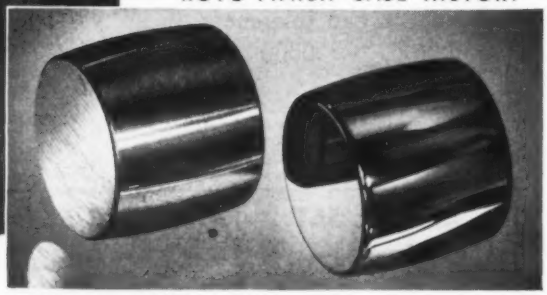
TRIAL AND ERROR FINISHING IS COSTLY

If you're now barrel finishing, our Customer's Man will welcome an opportunity to work with you in your own plant to show you how to get the finish you want, faster, and at lower cost.

If you're hand finishing, he can show you how to save up to 80% of your present finishing costs.

WANT PROOF? Then write or phone your Roto-Finish Customer's Man today.

ROTO-FINISH CASE HISTORY



*This photo is unretouched.
**MATERIAL: Bearing steel, 61 Rockwell C Scale.
DIMENSIONS: 1.213" dia. x 1.015".
FINISH BEFORE: Ground to 10 RMS.
FINISH AFTER PROCESSING: 2 to 4 RMS,
(with no dimensional change).

Roto-Finish COMPANY
3729 Milham Road
KALAMAZOO, MICHIGAN
Phone: Fireside 3-5578

ROTO FINISH

FOREIGN REPRESENTATIVES: ARGENTINA—Taller—Buenos Aires ● AUSTRALIA—A. Flavell Ltd.—Cheltenham ● BRAZIL—Commercial E. Industrial de Fornos Werco, Ltd.—Rio de Janeiro ● CANADA—Canadian Hanson & Van Winkle Co., Ltd.—Toronto ● ENGLAND—Roto-Finish Ltd.—Hemel Hempstead ● FRANCE—Societe Roto-Finish—Paris ● GERMANY, AUSTRIA, NORWAY, SWEDEN, SWITZERLAND—Metallgesellschaft A. G.—Frankfurt, a. M.—Germany ● HOLLAND, BELGIUM, LUXEMBURG—N. V. Roto Finish Maatschappij—Delft, Holland ● ITALY—Societa Roto-Finish a R. L.—Milan ● SPAIN—Instituto Electroquimico, S. A.—Barcelona

CIRCLE INFORM-A-GRAM KEY NO. 30

BOOK REVIEWS

AUTOMATION AND MANAGEMENT, by James R. Bright. Published by Harvard Business School, Division of Research, Soldiers Field, Boston 63, Mass., 1958. 280 pages, $10.

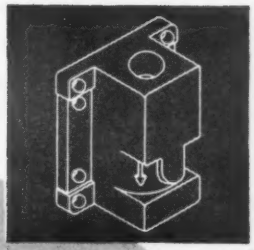
This book, an outgrowth of Harvard's research and firsthand observation of automated plants, presents a comprehensive picture of industry-in-change and of management's role in keeping abreast of and guiding this change. Dr. Bright, Associate Professor of Business Administration at Harvard Business School, sees management placed in the position of a machine designer in order to meet the technical and economic demands placed on the business by complex and costly automatic systems. Automation experiences in automotive, electrical, mining, and other industries are studied as to objectives, design, procurement, installation, and operation of automatic machinery. Resulting changes in management organization and effects on labor, sales and maintenance are thoroughly discussed. Dr. Bright outlines 17 levels of mechanization, ranging from hand operation to "thinking" machines, and arranges them in a mechanization profile which serves as a toll for analyzing automated systems. This study is extremely helpful for clarifying the many questions raised by the constant and inevitable progress towards automaticity.

BIBLIOGRAPHY OF FLUID POWER, Published by National Fluid Power Association, 1618 Orrington Ave., Evanston, Ill., 1957. 92 pages, paperbound, $2.

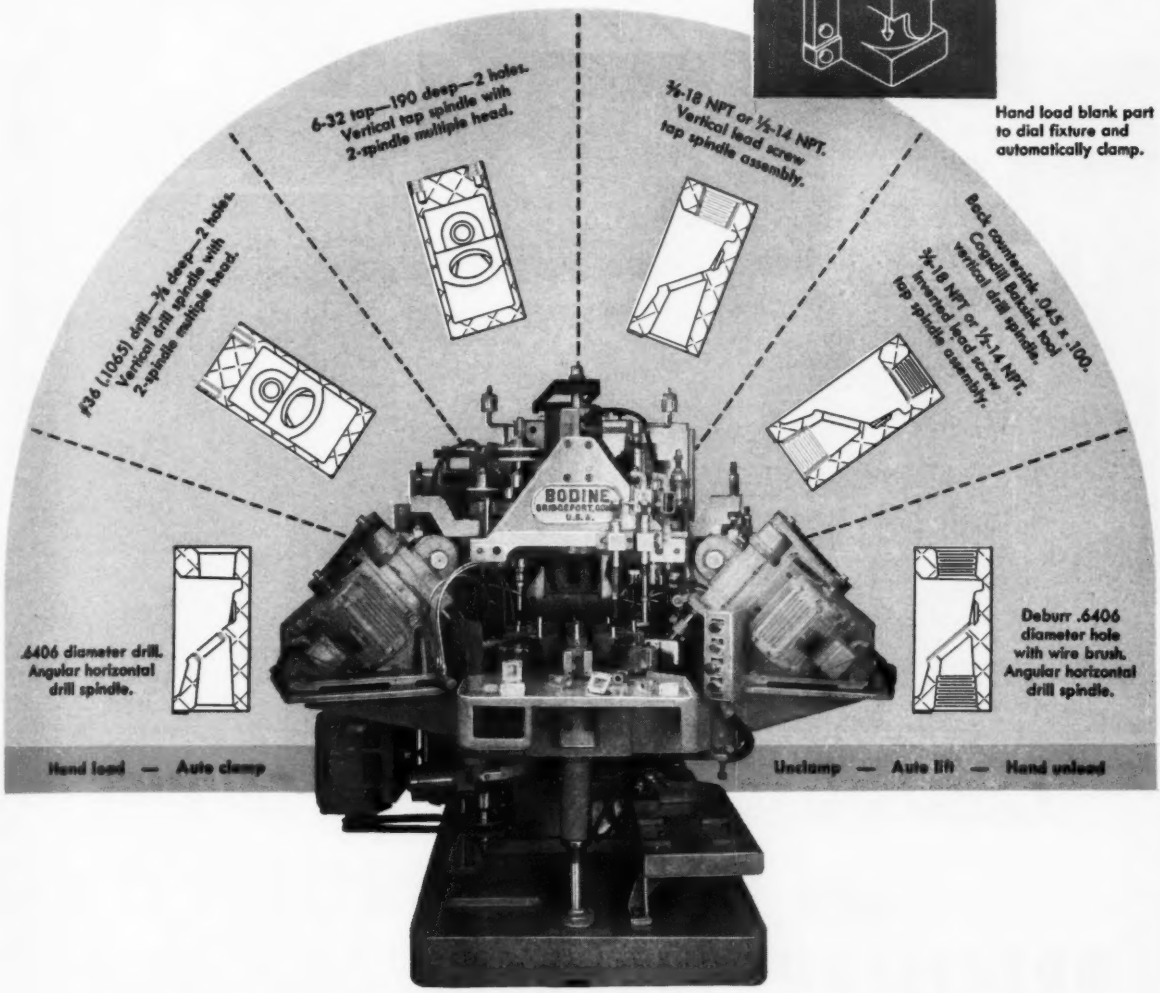
This compilation represents a cross-section of the best books available on fluid power. A brief description, table of contents, and other pertinent information is given for each of the books, which are listed under these three major divisions: Hydraulics, Pneumatics, and Fluid Power. Books are classified as either General, Basic Theory, Data and Tables, or Application. A loose-leaf format is used so that future additions, issued by the National Fluid Power Association, may be inserted conveniently.

. . . *Continued on Page 36*

Bodine case history no. 46



Hand load blank part to dial fixture and automatically clamp.


6-32 tap—.190 deep—2 holes. Vertical tap spindle with 2-spindle multiple head.
3/8-18 NPT or 1/2-14 NPT. Vertical lead screw tap spindle assembly.
Back counterdrill .045 ± .100. Cogsdill Balkrank tool. Vertical drill spindle.
3/8-18 NPT or 1/2-14 NPT. Inverted lead screw tap spindle assembly.
#36 (.1065) drill—3/8 deep—2 holes. Vertical drill spindle with 2-spindle multiple head.
.6406 diameter drill. Angular horizontal drill spindle.
Deburr .6406 diameter hole with wire brush. Angular horizontal drill spindle.
Hand load — Auto clamp
Unclamp — Auto lift — Hand unload
BODINE
BRIDGEPORT, CONN. U.S.A.

Good way to hold a winning hand

in competitive manufacturing.

This major manufacturer of automatic control equipment has used cost-reducing Bodine Basic Machines and tooling methods for many years.

The interesting new Bodine unit shown above went in to replace another machine . . . to include MORE OPERATIONS, performed at a FASTER RATE.

The new machine features recently-developed Bodine reversing motor-driven lead screw spindles . . . one vertical and one inverted. The valuable versatility of Bodine tooling with combinations of vertical, angular and inverted spindles is clearly demonstrated.

This is also an example of how advanced Bodine tooling is constantly stepping ahead of production demands, even among present Bodine users. In all cases, such tooling is readily adapted to present Bodine Basic units, an important cost-advantage users of our equipment enjoy.

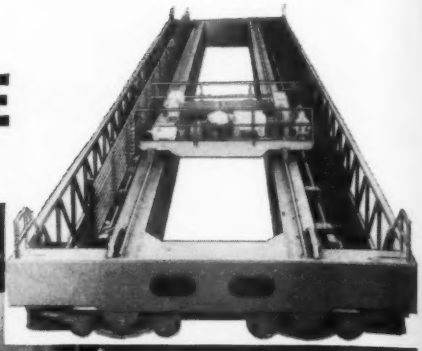
If you have a part you would like to produce better at lower cost, send us a sample and prints for analysis. No cost or obligation. Write Dept. TP-5.

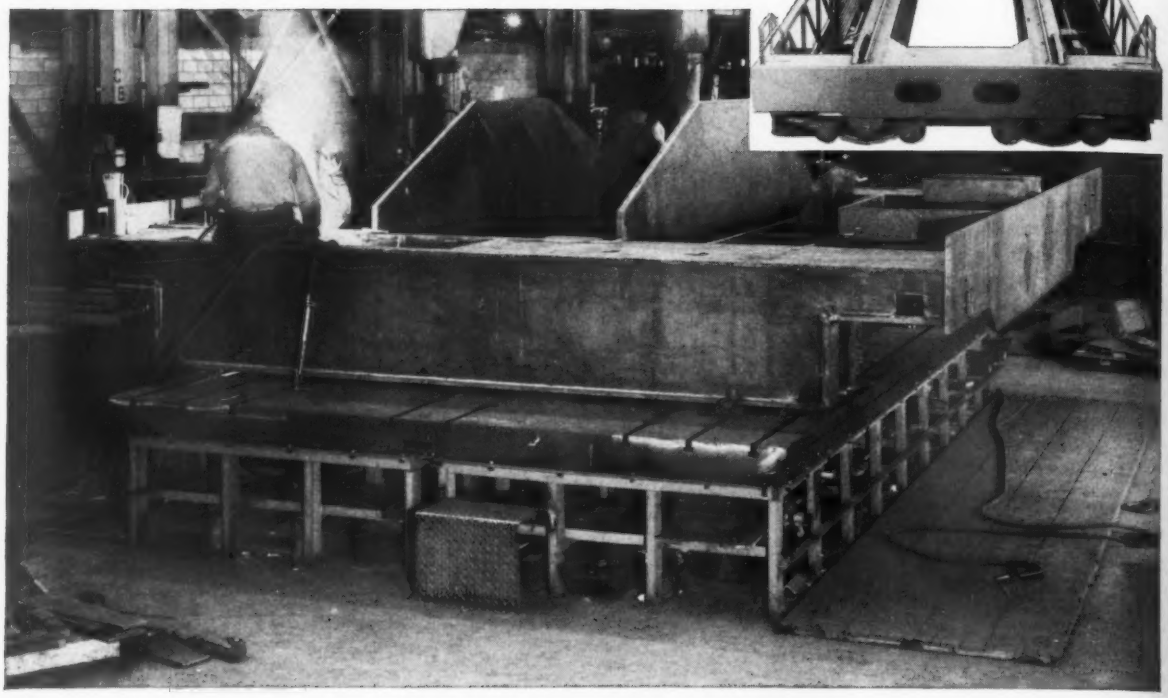
MATERIAL and PART: Zinc die-cast valve body.

PRODUCTION: 15 complete pieces per min.; 6000 operations per 50-min.hr.

THE Bodine CORPORATION
BRIDGEPORT 5, CONNECTICUT
AUTOMATIC DIAL TYPE DRILLING, MILLING, TAPPING, AND SCREW INSERTING MACHINES

PRECISION WELDING of a 20 TON TROLLEY CRANE





Another example of PRODUCTION SAVINGS *with* CHALLENGE®

PRECISION SURFACE EQUIPMENT

To reduce machining costs on the production of the 20-ton trolley crane assemblies for their huge cranes, Shaw-Box Crane & Hoist Division of Manning, Maxwell & Moore, Inc., decided to go to precision welding.

Needed was a large, accurate surface capable of supporting these large assemblies and providing an accurate reference base for the precision welding operation.

To provide the answer, Challenge supplied its standard 12 x 18 precision sectional layout plate with T-slots on the top and sides to permit the use of holding devices and with scribe lines at right angles as an aid to accurate positioning.

The results were so satisfactory, Manning, Maxwell & Moore purchased a second plate to expand these precision welding facilities.

When you have a problem requiring precision surface equipment of any type — semi-steel, granite, magnesium or aluminum — be sure to check Challenge, first! Ask for your copy of the catalog of Challenge **Standard** Precision Surface Equipment or write regarding your **special** needs.

Challenge

SE-118

THE CHALLENGE MACHINERY COMPANY • GRAND HAVEN, MICHIGAN

CIRCLE INFORM-A-GRAM KEY NO. 32

WHY USE TWO··

DRILL CHAMFER
DRILL C'BORE
DRILL DRILL
DRILL REAM
A FEW EXAMPLES OF HOW MOHAWK SUBLANDS MORE ECONOMICALLY ACCOMPLISH TWO OR MORE DIAMETERS WITH ONE TOOL IN ONE PASS
Let Mohawk prove to you that a Subland is the most efficient and economical tool to use for multiple drilling operations. Check your maintenance costs along with the number of pieces per grind. Mohawk will guarantee you a savings.

WHEN ONE WILL DO!

Why use two—or more standard twist drills to accomplish a multiple diameter cavity when *one* Mohawk Subland tool will do the job in *one* pass... and, do it more efficiently, accurately and economically!

Why overload yourself with an assorted inventory of ordinary drills when you can save time, money and equipment by combining your requirements in a few versatile, accurate Mohawk Subland tools.

One Mohawk Subland tool will outwork and outlast dozens of ordinary drills. Because Sublands are infinitely accurate and they can be repeatedly reground (in your shop) without losing their concentricity.

Examine your hole costs, then see for yourself how many places a Mohawk Subland could easily and effectively handle the job and reduce your hole costs all along the line.

Normal Delivery on
MOHAWK SUBLANDS
Size Optional — 3 to 7 Days
from receipt of order!

Write... Wire... Phone Today
and let a Mohawk engineer prove just how easy it is to save your time—money and tools through the use of Mohawk Sublands.

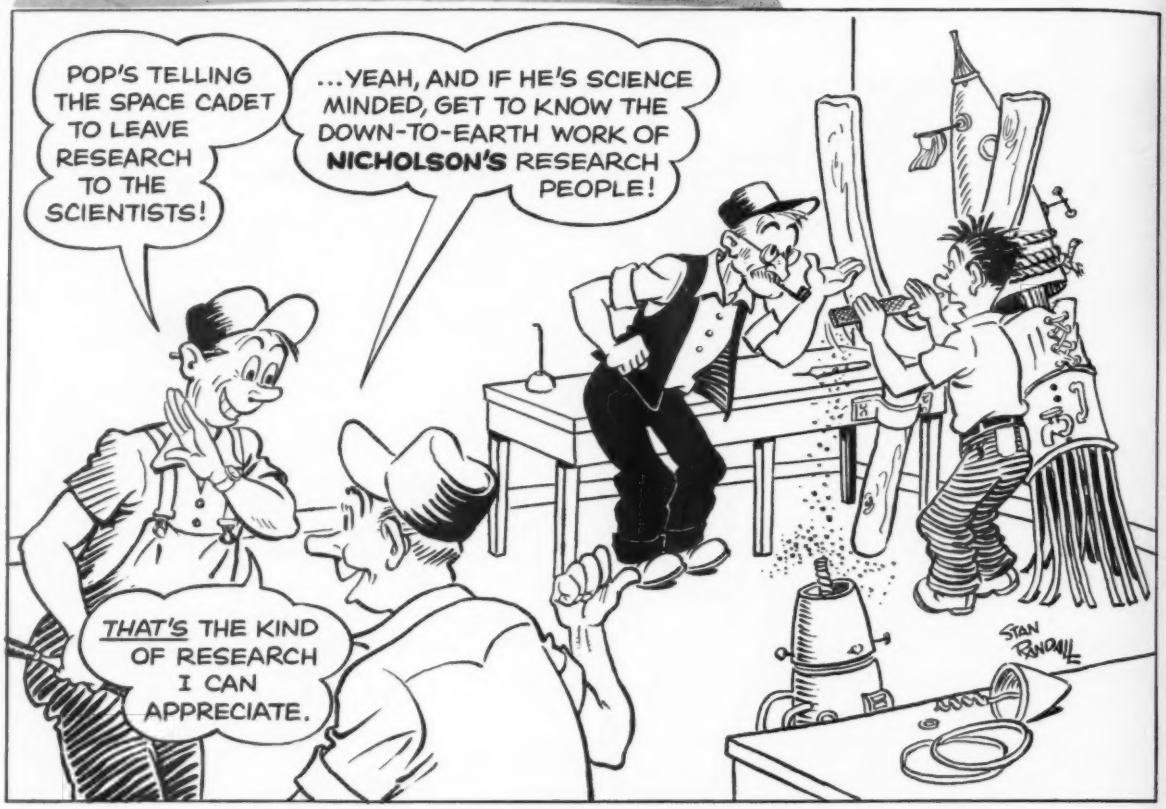
YOURS FOR THE ASKING
Request your copy of the new Mohawk brochure entitled "Why Use Two . . . When One Will Do". You'll find it's loaded with interesting ideas plus dozens of suggestions that will save you drilling dollars.

world's largest producers of Sublands

Mohawk TOOLS, Inc.
Montpelier, Ohio

CIRCLE INFORM-A-GRAM KEY NO. 33

POP'S school of Filing


POP'S TELLING THE SPACE CADET TO LEAVE RESEARCH TO THE SCIENTISTS!
...YEAH, AND IF HE'S SCIENCE MINDED, GET TO KNOW THE DOWN-TO-EARTH WORK OF NICHOLSON'S RESEARCH PEOPLE!
THAT'S THE KIND OF RESEARCH I CAN APPRECIATE.
STAN RANDALL

NICHOLSON RESEARCH SEEKS WAYS TO HELP YOU

Research has always been a part of our business—an important part.

From the time the first Nicholson file was made, we have had a research department which has constantly looked for and found ways to improve file design and manufacturing methods.

Today research is one of the most important parts of our engineering department. Our search for still further improvements goes on. Recently, this work led to the "Magicut," an All-Purpose Machinist's file (illustrated above) with a new type of tooth construction. This new file now cuts filing costs wherever many companies file metal.

In addition to new products, there's another service for you in our research department. When you have a filing problem, our research staff will gladly work out an answer. We have the facilities and the technical people to find the answer. If you'd like help with a filing problem, let your Nicholson or Black Diamond distributor know. We'll get you the answer quickly.

Industrial Distributors provide the finest goods and services in the least possible time. Our files are sold exclusively through them.

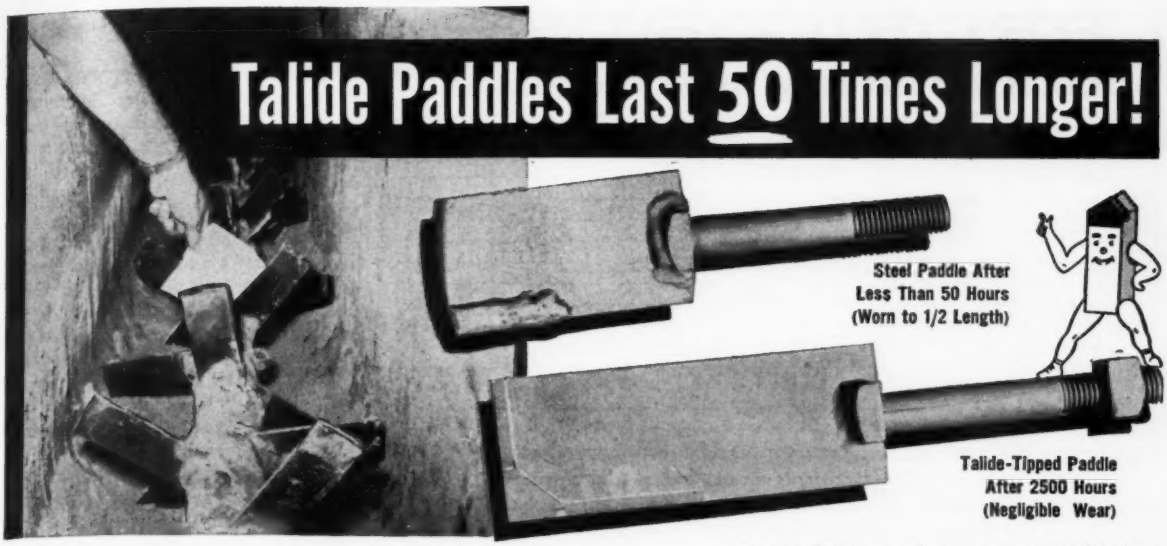
NICHOLSON U.S.A. **NICHOLSON FILE COMPANY, PROVIDENCE, RHODE ISLAND** BLACK DIAMOND U.S.A.

(In Canada: Nicholson File Company of Canada Ltd., Port Hope, Ontario)

NICHOLSON and BLACK DIAMOND FILES

A FILE FOR EVERY PURPOSE

Talide Paddles Last 50 Times Longer!



HARDEST MAN-MADE METAL!

TALIDE METAL, a tungsten carbide of superior quality, is harder, stronger, and more resistant to abrasion than any other metal. Properly applied, it gives superior service on applications where wear, heat, strain, and shock are destructive to other metals.

- **ABRASION RESISTANCE**— Up to 100 times that of steel.
- **COMPRESSIVE STRENGTH**— Higher than all melted, cast or forged metals and alloys.
- **RESISTANCE TO DEFORMATION**— 2 to 3 times greater than steel.
- **HEAT RESISTANCE**— Resists oxidation and thermal shock up to 1500° F.
- **THERMAL EXPANSION**— Less than half the rate of steel, "creep" is negligible.
- **FRICTIONAL RESISTANCE**— Lower than steel, non-galling, "slippery" properties higher.

ALL TALIDE METAL grades are made in latest type vacuum electric furnaces by precision methods under rigid control. A wide variety of shapes and sizes can be supplied—up to 25" in diameter, 100" in length, and 5000 pounds by weight. Parts can be supplied to any grit finish required down to one micro-inch. The physical properties of the most commonly used grades are listed below. Other grades are available for specialized applications.

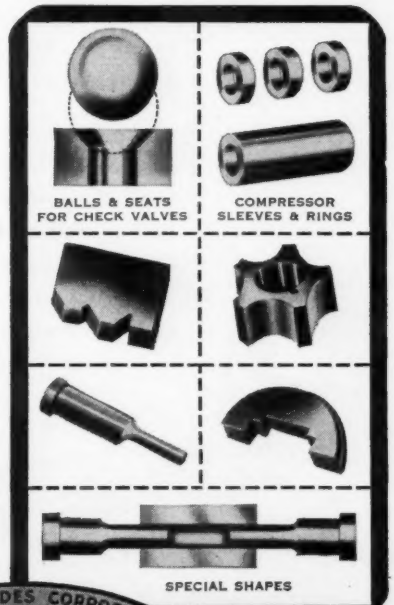
PHYSICAL PROPERTIES OF TALIDE METAL (P. S. I.)

Application	Operation	Talide Grade	Rockwell "A" Hardness	Specific Gravity (Density)	Transverse Rupture Strength	Compressive Strength	Co-Efficient of Thermal Expansion	Modulus of Elasticity (Deflection)
WEAR SURFACE	No Shock	C-91	91.8	14.90	235,000	710,000	3.00x10-6	91,000,000
	Light Shock	C-99	91.0	14.75	265,000	670,000	3.65x10-6	84,000,000
	Medium Shock	C-88	89.5	14.55	295,000	635,000	4.00x10-6	80,000,000
IMPACT	Light	C-85	88.4	14.25	315,000	600,000	3.75x10-6	77,000,000
	Medium	C-80	87.0	13.85	335,000	550,000	4.50x10-6	74,000,000
	Heavy	C-75	85.0	13.15	355,000	500,000	5.00x10-6	70,000,000

Note: Hardness values may vary plus or minus .2 to .3 on individual lots.

Leading brick manufacturer reports Talide-tipped pug mill paddles have outlasted 50 sets of hard-faced steel paddles to date—and are still in use. Operation involves mixing abrasive ceramic, clay and brick compositions.

TALIDE METAL is saving industry millions of dollars annually by wear-proofing vital parts on machine tools, presses, pumps, compressors and other types of processing equipment used in the steel, oil, chemical, plastic, auto, rubber, textile, glass, ceramic, mining and metalworking industry.



Send for new 76-page catalog 56-G or ask for sales engineer to call.

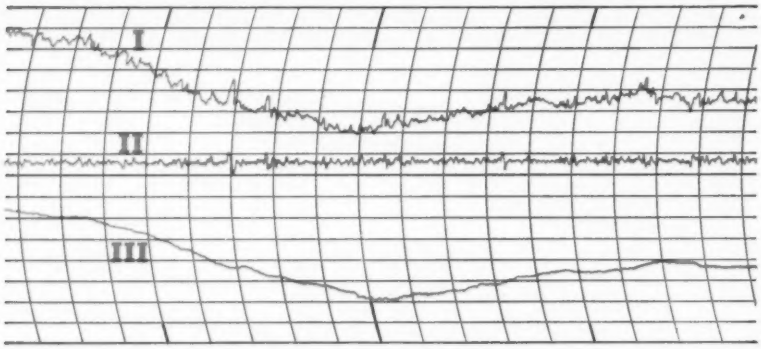
Metal Carbides Corporation
Youngstown 12, Ohio

METAL CARBIDES CORPORATION
TALIDE®
YOUNGSTOWN 12, OHIO
HOT PRESSED AND SINTERED CARBIDES • VACUUM METALS
HEAVY METAL • ALUMINUM OXIDE • HI-TEMP. ALLOYS
OVER 25 YEARS' EXPERIENCE IN TUNGSTEN CARBIDE METALLURGY

CIRCLE INFORM-A-GRAM KEY NO. 35

PROFICORDER®

MAKES MOUNTAINS FROM MILLIONTHS

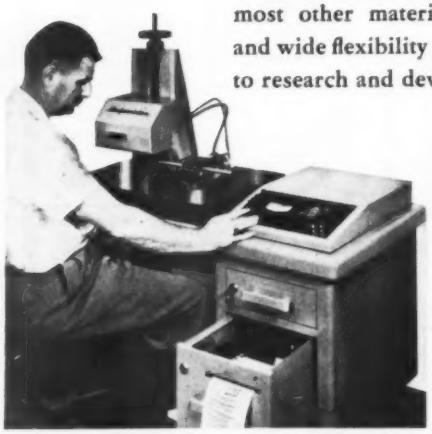


Three Proficorder records of same portion of a surface, reproduced ½ size, showing (I) total profile, (II) roughness profile, and (III) waviness profile. Note range of detail.

THE PROFICORDER draws a magnified profile of machined and finished surfaces, showing the *height, width* and *relative position* of the surface irregularities. It clearly shows any desired detail from over-all contour to fine roughness. Accordingly —

These charts permit detailed study and comparison of waviness . . . roughness . . . porosity . . . flaws . . . wear . . . and the effects of finishing processes.

The Proficorder will show (I) the total profile, (II) roughness alone, or (III) waviness, steps and other widely-spaced irregularities with roughness omitted. It is used on metals, paper, plastics, ceramics, and most other materials. Ease of operation and wide flexibility make it especially suited to research and development work.



FREE BULLETIN LT24

gives details. Write for it! And let us furnish you with profile charts of surfaces in which you are interested.

Proficorder is a registered trade-mark.

Made by the Profilometer® people —

MICROMETRICAL MANUFACTURING CO.

339 S. MAIN ST. ANN ARBOR, MICHIGAN

CIRCLE INFORM-A-GRAM KEY NO. 36

. . . Books from page 30

SALES COMPENSATION MANUAL. Published by Machinery and Allied Products Institute, 1200 Eighteenth St. N. W. Washington 6, D. C., 1958. 239 pages, $15 to MAPI members, $20 to non-members.

New methods, designs, and products in the metalworking industry gain greater distribution and recognition through the efforts of the industrial salesman. Appropriate and practical methods of compensation for the sale of industrial equipment are presented in outline form in this book. Its intended use as a reference and working manual is enhanced by its form and clarity. Provisions of actual sales compensation plans in effect for many industrial firms are examined in detail. Topics covered include determination of total earnings, base salary, and incentive compensation; adaptability of a plan; teamwork; and the mechanics of formulating and administering a sales compensation plan.

TECHNIQUES OF PLANT MAINTENANCE AND ENGINEERING - 1958. Published by Clapp and Poliak, Inc., 341 Madison Ave., New York 17, N. Y., 1958. 211 pages, $10.

This book reports the proceedings of the Plant Maintenance and Engineering Conference held in Chicago last January. Included are texts of 35 papers dealing with plant maintenance practices in the metalworking, metal fabricating, foundry, steel, and other industries. The transcripts of the informal round table discussions, and question and answer sessions after each paper, are as enlightening as the papers themselves. Maintenance in small and large plants is discussed, including such aspects as welding, upkeep of electric motors, labor relations, preventive maintenance, and the impact of automation.

PLANT ENGINEERING PRACTICE, by the editors of Plant Engineering. Published by F. W. Dodge Corp., New York, N. Y., 1958. 694 pages, $18.50.

Every major area of plant engineering activity is covered in this book, which is made up of reprints from Plant Engineering magazine. Practical solutions to problems in their own plants are presented by top plant engineers in this compilation. Sections include layout, construction, safety, materials handling, maintenance, instrumentation and quality control, and shopwork.

Better machining starts with Alcoa Screw Machine Stock

Here's fast, precise deep drilling with ALCOA ALUMINUM 2011-T8

Wall thickness only .024 in. —calls for accuracy

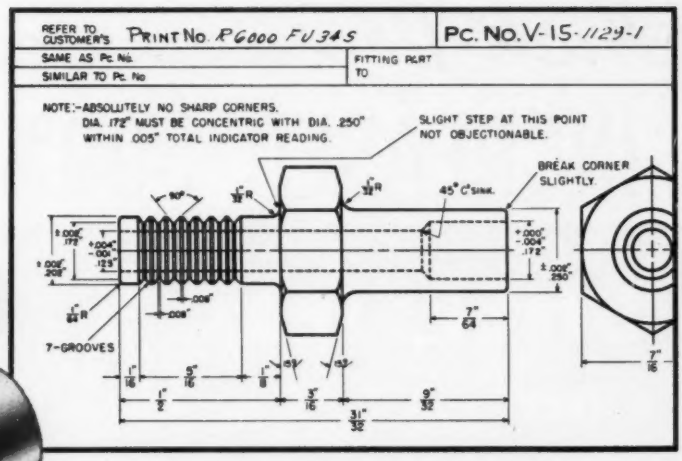
This fitting has a deep-drilled .125 in. dia. hole—approximately 7 diameters of the drill in depth. Now look at the drawing. Notice the concentricity tolerance on the hole with a wall thickness of only .024 in. (difference between base of V-groove and hole diameter)—no place for a drill to wander.

If you're handed a job like this, ask for ALCOA® Aluminum 2011-T8 (artificially aged 2011-T3), best for deep drilling where the ratio of length to diameter of the hole is 5:1 or more. With 2011-T8, you'll get accurate concentricity while maintaining fast feeds and speeds (see layout).

Speed and accuracy are only part of the story. ALCOA Aluminum retains the surface finishes produced by machining—cut-off finish is superior. You can polish, buff, brush or burnish aluminum—and parts don't deteriorate in storage. Aluminum's light weight means easier handling, faster stock-up time.

For more about better machining with ALCOA Screw Machine Stock—

- Meet Tom Conroy, ALCOA's field consultant. He'll be glad to demonstrate aluminum's advantages. See coupon.
- Ask for immediate stock delivery by calling your nearest ALCOA sales office or distributor.


REFER TO CUSTOMER'S PRINT No. R6000 FU345
PC. NO. V-15-1129-1
SAME AS Pc. No.
SIMILAR TO Pc. No
FITTING PART TO
NOTE:-ABSOLUTELY NO SHARP CORNERS.
DIA. .172" MUST BE CONCENTRIC WITH DIA. .250" WITHIN .005" TOTAL INDICATOR READING.
SLIGHT STEP AT THIS POINT NOT OBJECTIONABLE.
BREAK CORNER SLIGHTLY.
45° C'SINK.
7-GROOVES

MULTIPLE SPINDLE LAYOUT

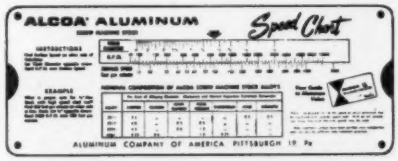
Date 11/6/54	Pc. No. V15-1129-1	Order No.
Mach. ½" Dav.	Mach. No. Mod. B	Material Grade 2011-T8
Chucks 7/16 Hex.	Fingers 7/16 Hex.	Material Size 7/16 Hex.
Spindle RPM 3000	Gears 42-21	
Kind of Threading Spindle	Ratio On Off	
Threading Rev.	Total Useable Rev./Pc. 108	
Surface Speed 397 Ft. Per Min.	Min. Index Time 2/3 Sec.	
Time Per Pc. 2.8 Sec.	Feed Gears, Idler 50-60-80	

SEQUENCE OF OPERATIONS

Operation	Cut	Rise	Lev.	HOND	Feed	Cam No.	Tool	Holders	Special
1—Box .250" Dia.		.296	.79		.0027	3/8	15-1131-1	#20 Box Tool	
Center							Pick-up in Above Tool		
2—R. Form		.171	.92		.0016	1/16	15-1129-1	Cir.	(Carboloy)
Drill .172" Dia.		.375	1.		.0034	3/8	11/64" Dia. Twist	#20 Floating	
Support							15-1129-1 in Above Holder		
3—Form (Grooves)		.062	1.		.0006	1/16	15-1131-1	Cir.	
Drill ⅛" Dia.		.750	1.		.0069	Spec. Pull-out	#30 Twist	#20 Floating	
Support							15-1129-1 in Above Holder		
4—Drill ⅛" Dia.		.187	1.		.0017	3/16	#30 Twist	#20 Floating	
5—Cut-off		.341	.91		.0031	3/8	15-1131-1	Cir.	

FREE!

Send for Alcoa's *Speed Chart*, a handy slip-stick calculator for every screw machine operator—and *Alcoa Aluminum in Automatic Screw Machines*, valuable procedures manual written for production men.



look for this label . . . it's your guide to the best in aluminum value

ALCOA ALUMINUM
ALUMINUM COMPANY OF AMERICA

ALCOA THEATRE
Fine Entertainment
ALTERNATE MONDAY EVENINGS

Aluminum Company of America
876-K Alcoa Building, Pittsburgh 19, Pa.

Yes, I'd like to—

☐ **hear from Tom Conroy**
☐ **have a copy of your book and a *Speed Chart***

Name_____

Position_____

Company_____

Address_____

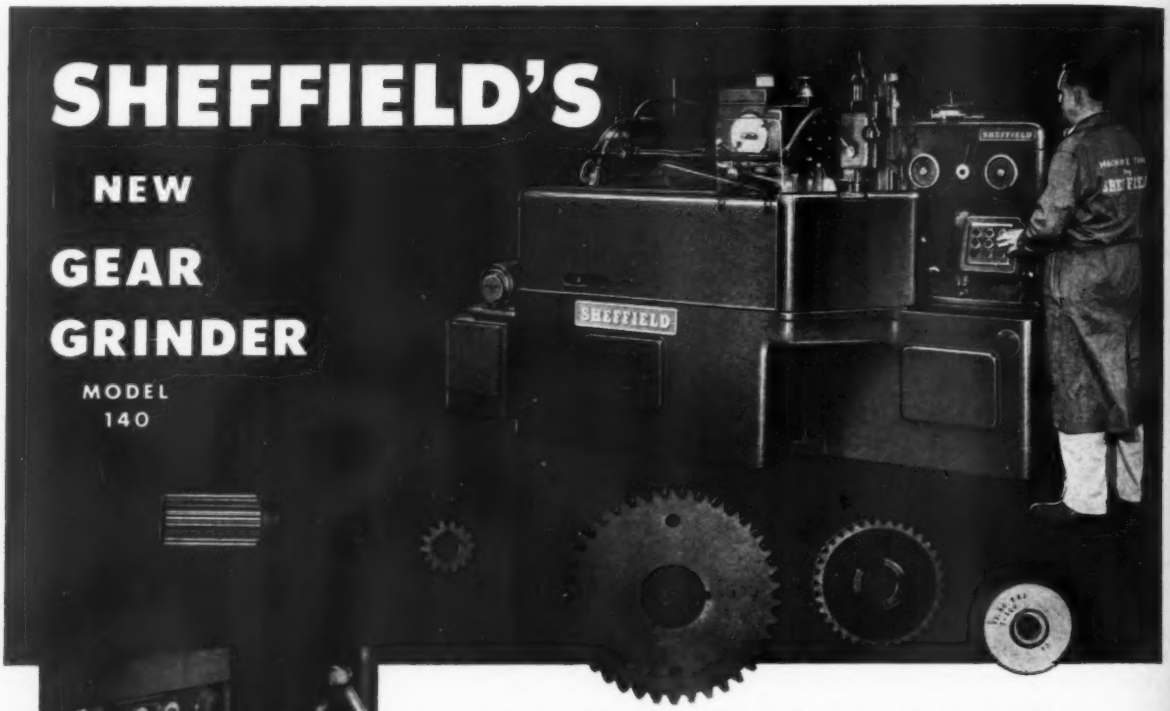
City_____ **Zone**____ **State**_____

CIRCLE INFORM-A-GRAM KEY NO. 37

High-Precision Gear Production

INCREASED 300% *on*

SHEFFIELD'S NEW GEAR GRINDER MODEL 140



Relationship of crushing roll, grinding wheel and work part.

Precision gears for aircraft, fire control, servo mechanisms, guided missiles, transmissions and machine tools may be ground to a total composite error of less .0005" at production rates three times faster than heretofore possible.

The secret is a fast-cutting grinding wheel accurately crushtrued to the basic rack form, operated like a hob and with the work rotating as the teeth are ground—either from the solid hardened blank or a preformed gear.

FIELD REPORTS—An aircraft engine manufacturer says "Gears ground on the Model 140 Grinder have passed our surface tempering inspection and show no grinding burns".

A large precision instrument manufacturer, in speaking of the Model 140, writes, "We have inspected gears ground on prominent gear grinders of both American and European manufacture. Our findings have revealed that this machine is by far the most accurate to date."

MACHINE CAPACITY (Work Gear)

Outside Diameter	Up to 8"	Pitch	8 to 100
Face Width	Up to 5"	Helix Angle	Up to 45°
Distance between centers	15"		

For complete information, write to The Sheffield Corporation, Dayton 1, Ohio, U.S.A., Dept. 20

7656

the SHEFFIELD *corporation*
of Bendix Aviation

manufacture and measurement for mankind

CIRCLE INFORM-A-GRAM KEY NO. 38

GUARANTEED

...the most precise chuck ever produced

THE NEW Supreme KEYLESS Precisionist

Made by **Supreme** in **Chicago, U.S.A.,** for the most exacting production line and toolroom use.

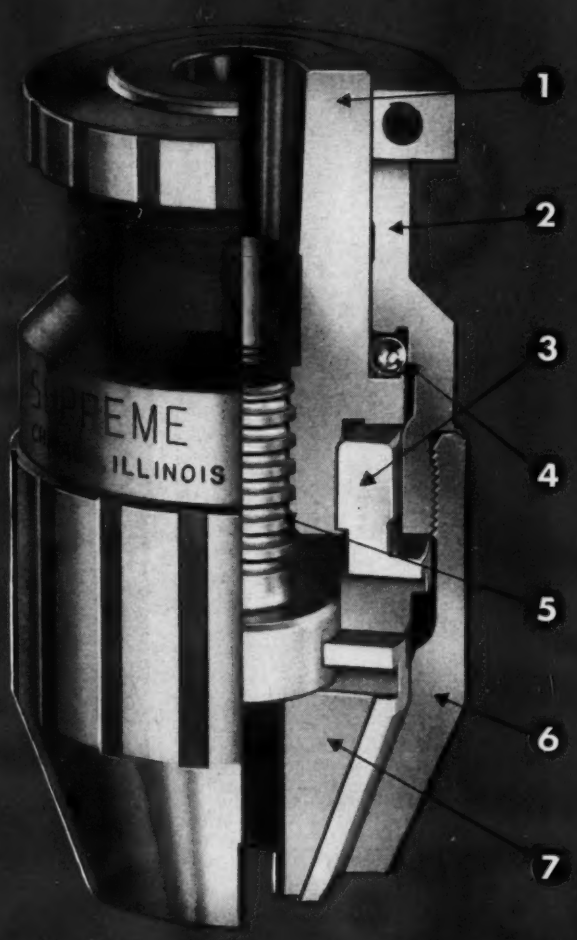
- Exclusive **tool steel jaws**
- Precision-quality **ball** bearings
- Unsurpassed **gripping** power
- Unmatched **accuracy**
- Trouble-free **keyless** action
- Controlled **uniform** materials
- Available now: ½" capacity in Tapers #2, 6, 33 . . . ⅝" capacity in #6 Taper
- Available soon . . . ¼" and ⅜" capacities

1 **CHUCK BODY**—Ground to extra precision limits. Taper bore air gage checked.

2 **GUIDE HOLDER**—Internal diameters and shoulder ground in one setting. External shoulders precisely located.

3 **JAW GUIDE**—Ground to perfect matching fit.

4 **THRUST RACE BALL**—Hardened chrome steel.



5 **SCREW**—Carbo-nitrided steel.

6 **SLEEVE**—Carbo-nitrided steel, extra high surface hardness. Ground to gage makers' tolerances.

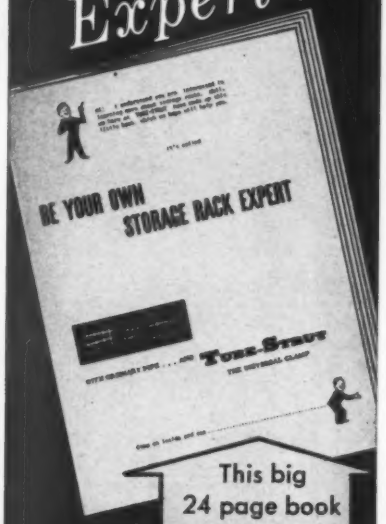
7 **JAW**—Tool steel material, hardened throughout.

Supreme Industrial Distributors stock them to serve you.

Supreme BRAND Chucks

SUPREME PRODUCTS CORPORATION
2222 S. Calumet, Chicago 16
A DIV. OF A•S•R PRODUCTS CORP.

Be your own STORAGE RACK Expert!



This big 24 page book SHOWS you how

- To build your racks
- in ½ the time
- at ½ the cost
- with ordinary pipe

free UPON REQUEST

MAIL THE COUPON TODAY

A practical handbook that gives step by step instructions on storage rack design and construction. You'll be amazed at how easily, quickly and economically you can convert ordinary pipe into practical, successful storage racks that meet every requirement.

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Los Angeles 39, Calif.

Rush your new book—"Be Your Own Storage Rack Expert" to—

Name_____

Firm_____

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City_____ State_____ TPB 2

CIRCLE INFORM-A-GRAM KEY NO. 40

MANUFACTURING MEMOS

SAY IT . . . Businessmen must "speak out forthrightly on the issues that are vital to business and the public interest, whether or not they are controversial," contends J. S. Parker, General Electric vice president of Public and Employee Relations. Corporate relations work, he says, maintains a political, social, and economic climate so business can better serve its customers for the benefit of everyone. GE recently established a Government Relations Service to help the company and its personnel get a working knowledge of the interaction of government and business.

Speaking of personnel. . . the tool and die employees at GE's Medium AC Motor and Generator Dept. have gone four years without an accident. They deserve a pat on the back and more for what could be a national record for this type of work. During the 1955-58 period, approximately 1,955,000 man-hours were worked without a mishap. Congratulations!

ON HOME GROUND . . . You don't have to go to The Sheffield Corp. — they now come to you. A station wagon, outfitted with the Measuray non-contact X-ray thickness gage, is touring the country to give on-the-job demonstrations to producers and fabricators of plastic film and thin metal strips. Make reservations now through the local rep or the Autometrology Division.

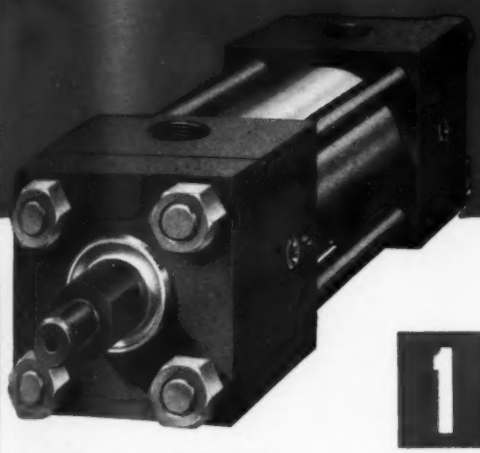
RUSTY SURVEY . . . After studying the situation for 25 years, Rust-Oleum Corp. has found that the country's fast-rusting areas are near water. Therefore, if your metal is disintegrating, move to Arizona. No sinus trouble there either! Auto-license-plate-size pieces of steel were left in representative cities around the U. S. In Coastal cities they bit the dust in only three short years, while in dry regions it took as long as 15 years to rust the plates through.

NEW DIVISION . . . Wheelabrator Corp.'s new division, formerly Crandall Engineering and Mfg. Inc., is now known as the Techline Division. The unit manufacturers and sells precision finishing equipment, and has set up complete experimental and demonstration laboratories at the Vicksburgh, Mich. location. In charge are George H. Hieser, field sales manager; Roy Romine, founder of Crandall, chief engineer; and Lee Stevens, director of process engineering.

GROWING UP . . . A young firm, the Vee Bee Mfg. Co. has begun production of boring bars and cutters for metalworking applications. The new line features heat-treated high-alloy steel bars and cutters, rough-boring, finishing-boring, and combination tools. Established in January of 1956, the company was organized by Willard F. Bierama and Clarence Vanderlinde to do contract work on precision aircraft parts.

SEAL FAILURE MEANS CYLINDER FAILURE

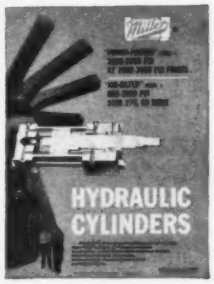
...leum base, fire-resistant and special hydrau... fluids cause distortion and rapid deterioration ... the seals currently used in many hydraulic ...inders, resulting in costly repairs and cylinder ...ure. (Seals made of synthetic rubber are not ...patible with even 50% of available com... ...ial petroleum base fluids and the life of such ...ds is materially reduced at operating tempera... ...ures above 150° F.)



Specify Miller HYDRAULIC CYLINDERS

FOR UNLIMITED SEAL LIFE!

Request Bulletin JH-104N for complete data plus helpful charts on column strength, cylinder forces, factors of safety, acceleration, pipe pressure losses, etc.



1

ALL TEFLON* SEALED Against External Leakage

TEFLON is impervious to all known hydraulic fluids, including all fire-resistant and special types – and withstands temperatures from —100°F. to plus 450°F.

TEFLON SHEF SEAL AT TUBING ENDS

No blind assembly. Is
Shear-proof
Heat-proof
Extrusion-proof
Fluid-proof

TEFLON SEALS ON PISTON ROD AND BUSHING

Teflon rod flange seal requires no adjustment. Teflon bushing seal is shearproof. Teflon wiper keeps dirt out.

TEFLON SEALS ON BALL CHECK AND ADJUSTING SCREW

Non-protruding, self-locking, cushion adjusting screw interchangeable with ball check for easy access.

2

CASE-HARDENED CHROME PLATED PISTON RODS

Provide foolproof protection against seal failures resulting from rod damage. The Miller case-hardened rods (50-54 Rockwell C) give practically complete immunity to damage from hammer blows, wrench-dropping, mishandling, etc. The hard chrome plating over the case-hardened rods protects against scratch-damage and rust.

AVAILABLE IN TWO TOP QUALITY LINES

JOB-RATED
Model "J"

PRICE SAVINGS OF 27% OR MORE!

19 mounting styles, all strokes, cushioned and non-cushioned. Large selection for immediate shipment.

BORE	SEVERE OPERATING CONDITIONS	MODERATE OPERATING CONDITIONS	YOU SAVE THIS % IN PRICE OVER STANDARD 2000-3000 PSI CYLINDERS
1½"	1500 PSI	2500 PSI	27%
2	1500	2500	27%
2½	1000	1500	28%
3¼	1500	2500	32%
4	1000	1500	35%
5	800	1200	37%
6	800	1200	43%
8	500	800	50%
10	500	800	71%
12	500	800	76%
14	500	800	*Not Available in 2000-3000 PSI*

POWER-PACKED
Model "H"

50% More Power Per Cylinder Dollar!

For
3,000-5,000 P.S.I.

1½" through 12" bores, 17 mounting styles, strokes up to 22 ft., cushioned and non-cushioned. Large selection for immediate delivery.

*DuPont trademark for its tetrafluoroethyline resin

OTHER MILLER QUALITY FEATURES

- Solid Steel Heads, Caps and Mountings.
- Precision-Honed Barrels.
- Rust-Resistant Coating on All Non-Wearing Surfaces.
- Space-Saving "Square" Design.

MILLER FLUID POWER
DIVISION OF FLICK-REEDY CORPORATION

2046 N. Hawthorne Ave. Melrose Park, Illinois

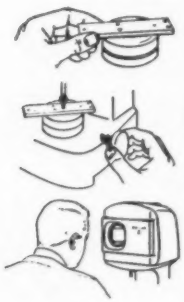
AIR AND HYDRAULIC CYLINDERS • ACCUMULATORS
COUNTERBALANCE CYLINDERS • BOOSTERS

New! BAUSCH & LOMB DR-25 OPTICAL GAGE

Direct scale reading to .0001" ...

0" to 3" range ... accurate to .000025"!

FAST, EASY AS A-B-C!



A Just set part to be measured on anvil ... no masters or set gages needed. Large work table makes it easy to adapt special fixtures, accommodates widest variety of work.

B Turn knob to lower spindle ... it will stop automatically on contact, with constant spindle pressure.

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BAUSCH & LOMB SINCE 1853

CIRCLE INFORM-A-GRAM KEY NO. 42

MANUFACTURING MEMOS

New Officers

Election of officers of National Fluid Power Assoc. resulted in the naming of John A. Marsh, president; L. L. Charlson, first vice president; and Frank Flick, second vice president.

Changes Name

Industrial Controls Section is the new name of the Controls Section of Bendix Aviation Corp. This switch is supposed to better describe the numerical controls now being manufactured and sold by the section.

Wider Horizons

Development of new products and special automation machinery will be the main use for the 5,000-sq-ft expansion just completed by Sahlin Engineering Co., Inc.

A $2 million expansion program begun by Cleaver-Brooks Co. will provide optimum service to eastern customers, according to J. C. Cleaver, president. Plans include a 70,000-sq-ft addition to the Lebanon, Pa. plant, and a new 25,000-sq-ft production facility at Stratford, Ontario.

Trade Missionaries

Helping international trade relations in the machine and tool industries is John D. Dewhurst, president of Arrow Tool Co. He's been appointed a member of the U. S. Trade Mission to Yugoslavia and will represent the U. S. at the fairs at Belgrade and Zagreb. Other members of the trade mission, sponsored by the U. S. Department of Commerce, include Fred Wittner, Robert C. Gordon, Harold E. Allen, and Walter C. Clyde, Jr.

Distributors

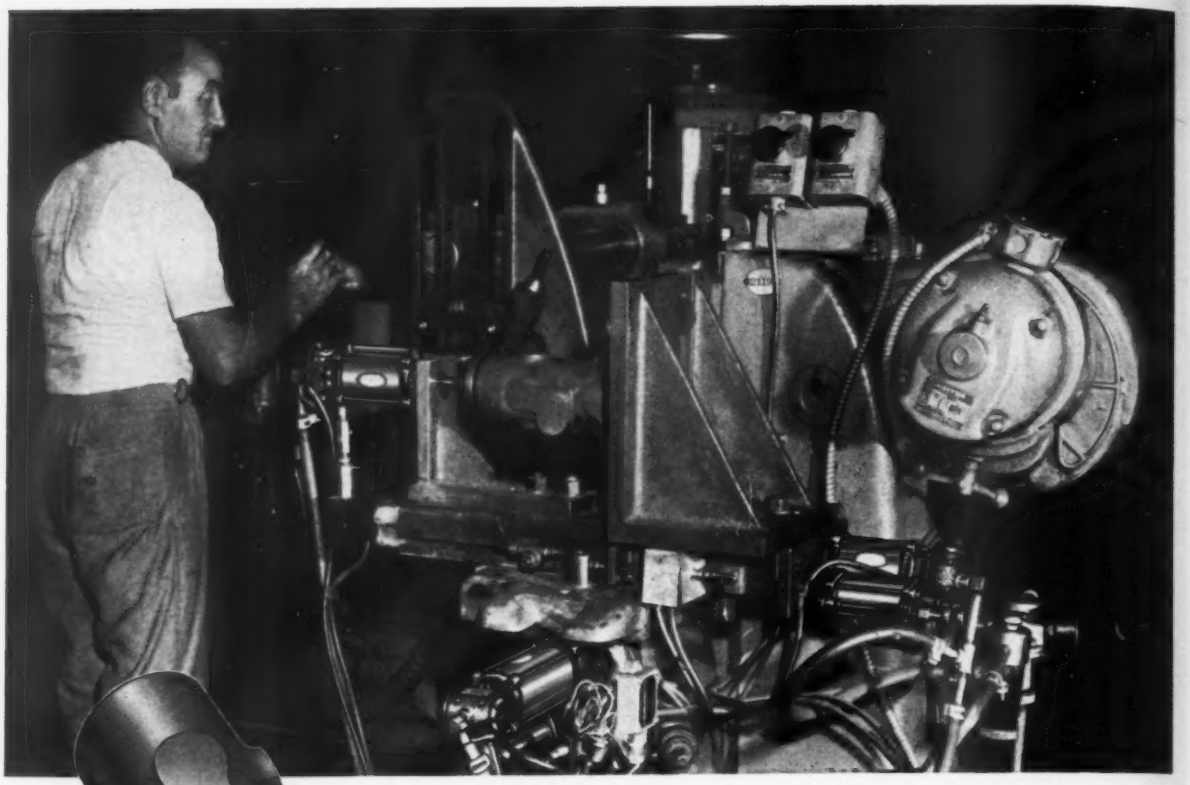
The H. F. Dickerman Mfg. Co., manufacturer of automatic punch press feeds, has added several companies to its distributor list. Handling the Cleveland area and northeast Ohio is Cleveland Duplex; northwestern Ohio, Midwest Die Supply Co.; and southern Ohio, Production Engineering Sales Co.

THE NEW

No. 2 UNIVERSAL GRINDER

FEATURES:

PARKER • MAJESTIC PM PRECISION MACHINES



"He took a dim view of the whole idea"

As reported by the foreman of a department at American Bosch, Springfield, Mass.: "We were milling a tapered slot in a 30 lb. housing for a CQ pump. When I told the operator we were going to "automate" the milling operation with Bellows Air Motors, he said "ixnay", he didn't want any part of it.

"You should have seen him at the end of the first day. He went home like he was walking on daisies. 'Baby', he said, 'with this Bellows equipment, milling these 30 lb. housings is a lead pipe cinch.'

"He was happy. We are happy. He gets home in the evening fresh enough to play around the golf course, and we, well, we're getting better tolerances, better finish, at less cost".

** from the case history files of The Bellows Co.*

Wherever Bellows Air Motors and Bellows air-powered production units are used to convert manually operated units to automatic machines, you'll find both operator and management singing their praise. To the operator, Bellows equipment brings less fatigue, greater safety — to management, a better product at lower cost.

1147-B

This may be helpful

If your catalog files on Bellows "Controlled-Air-Power" Devices are not up-to-date, ask us to send you a new complete catalog.

Write Dept. TP-1058, The Bellows Co., Akron 9, Ohio. In Canada: Bellows Pneumatic Devices of Canada, Ltd., Toronto 18, Ontario

The Bellows Co.

DIVISION OF INTERNATIONAL BASIC ECONOMY CORPORATION

AKRON 9, OHIO

CIRCLE INFORM-A-GRAM KEY NO. 44

MANUFACTURING MEMOS

Coming Events

Oct. 13-15 American Institute of Electrical Engineers' Machine Tool Conference, Statler Hotel, Hartford, Conn.

Oct. 13-16. Society of Industrial Packaging & Materials Handling Engineers' 13th Annual Exposition, Competetion, Colisium, Chicago.

Oct. 14-16. American Society of Mechanical Engineers and American Society of Lubrication Engineers, Joint Lubrication Conference, Statler Hotel, Los Angeles.

Oct. 16-17. American Machine Tool Distributors' Assoc.'s Annual Meeting, Sheraton-Plaza Hotel, Boston.

Oct. 16-17. Illinois Institute of Technology and Armour Research Foundation, National Conference on Industrial Hydraulics, Hotel Sherman, Chicago.

Oct. 20-22. Society of Automotive Engineers' National Transportation Meeting, Lord Baltimore Hotel, Baltimore.

Oct. 21. Society of Plastics Engineers' Regional Technical Conference, Curtis Hotel, Minneapolis.

Oct. 22-24. Society of Automotive Engineers' National Diesel Engine Meeting, Lord Baltimore Hotel, Baltimore.

Oct. 26-29. American Gear Manufacturers Assoc.'s Semi-Annual Meeting, Edgewater Beach Hotel, Chicago.

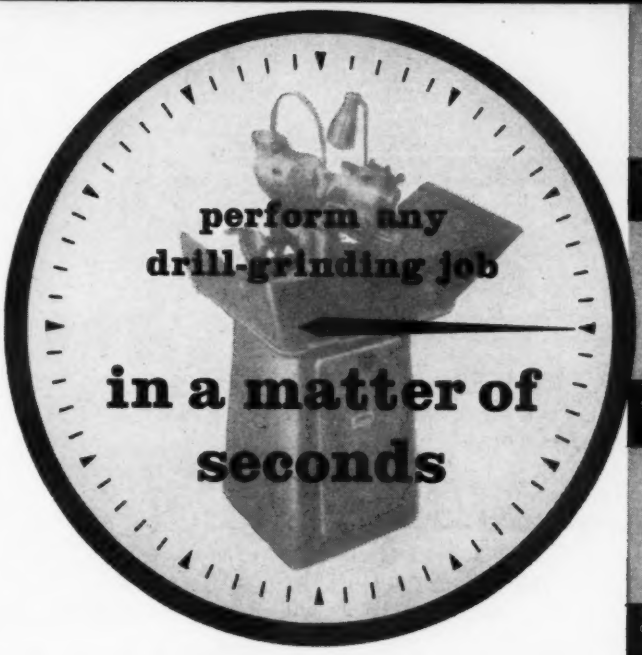
Oct. 27-31. American Society for Metals' National Metal Congress Exposition, Public Auditorium, Cleveland.

Oct. 27-30. Annual Fall Meeting, The Metallurgical Society of the American Institute of Mining, Metallurgical and Petroleum Engineers, Carter Hotel, Cleveland.

Oct. 29-30. Armour Research Foundation's Computer Application Symposium, Morrison Hotel, Chicago.

Oct. 29-31. Annual Meeting of the Metal Treating Institute, Hotel Cleveland, Cleveland.

new, revolutionary
ALINA
SELECT-O-POINT
drill grinders



Right hand twist drill with centre
Twist drill for soft material, lips corrected
Three flute drill, core drill
Spot facing cutter, countersink angle 60°
Screw tap, grinding of the angle of rake

Designed for rapid and accurate grinding of:
Keyway Milling Cutters • End Mills
Spot Facing Cutters • Screw Taps
Twist Drills • Step Drills • Reamers, etc.

Three models to choose from — *No. 01-2 Range .004" thru.080"—No. 03-6 Range .012" thru .240"—No. 2-32 Range .093" thru 1.250".* Each machine is a complete system built around a *planned drill point.* Applied to twist drills, this new drill point will increase the useful life of your drills — reduce the drill thrust force — eliminate the need for center punching — produce a rounder and more accurate hole — and on the larger drills afford you a drill point that will produce a round and almost burr-free hole in sheet metal. Fully variable adjustments may be accomplished with a minimum of effort; settings once selected may be altered or repeated *exactly* at any time. Accuracy and simplicity is built into each machine.

WRITE FOR ILLUSTRATED LITERATURE.

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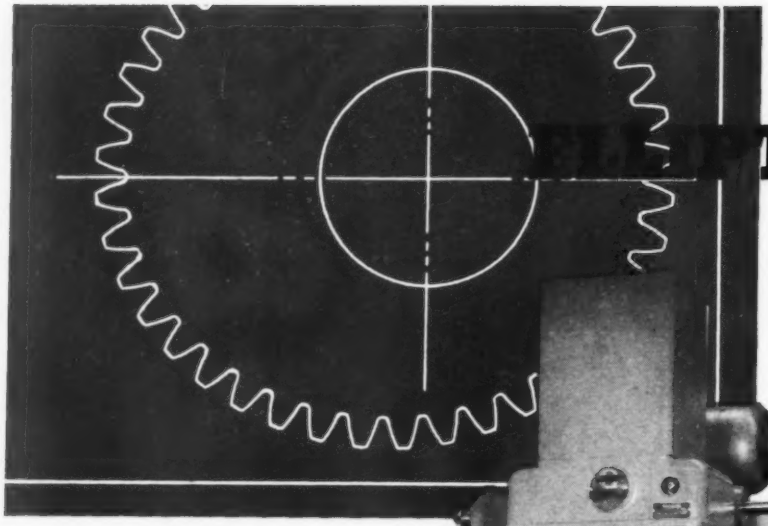
122 East Second Street, Mineola, Long Island, New York
Alina Corporation, 853 East 8 Mile Road, Detroit 20, Michigan
Jerico, Inc., 4744 West Lake Street, Chicago 34, Ill
CIRCLE INFORM-A-GRAM KEY NO. 45



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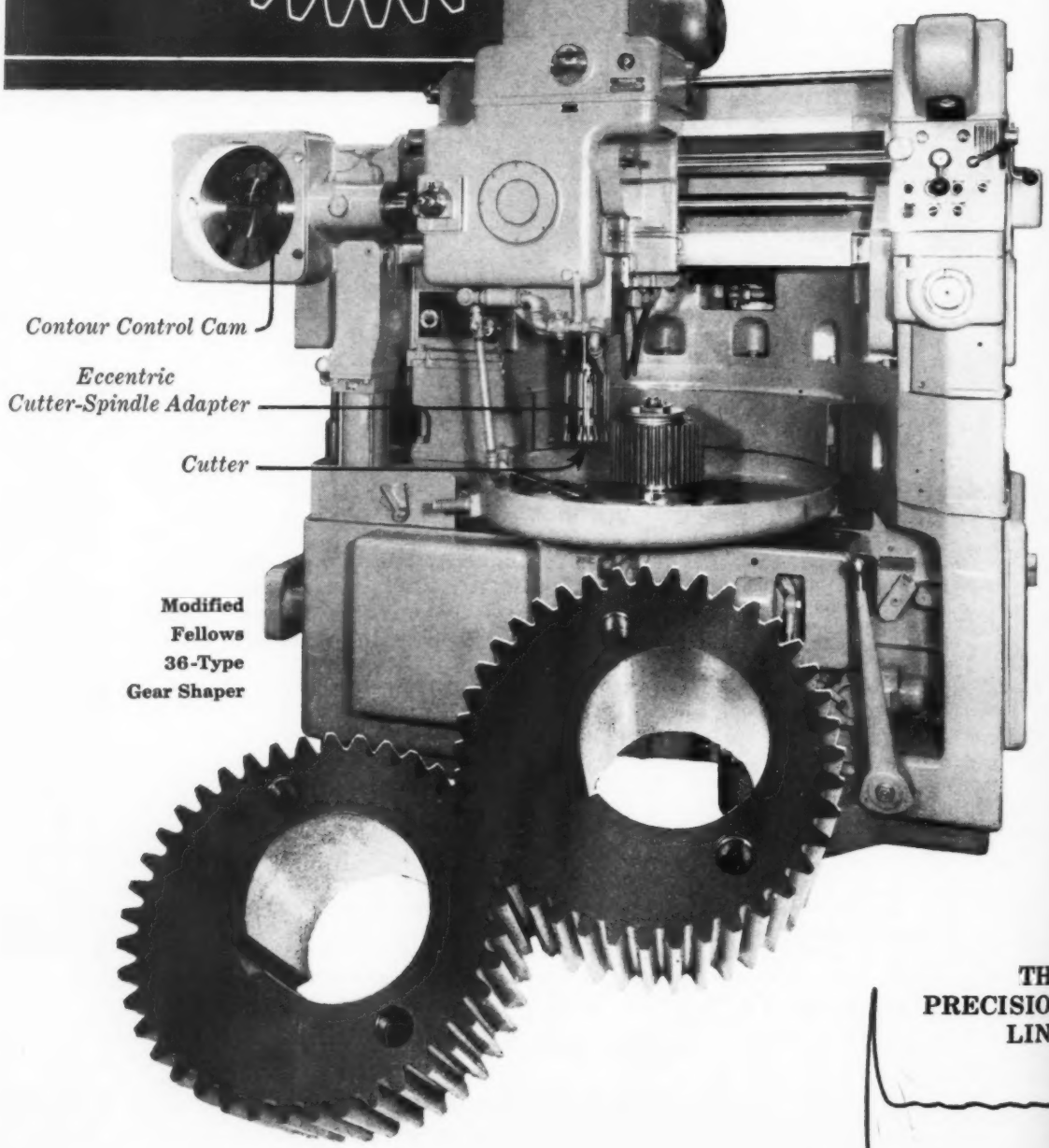

THE PRECISION LINE

OVAL GEARS

Fellows 36-Type Gear Shaper

Now... you can generate accurate oval and elliptical gears, and other irregular shapes, rapidly and economically. Once setup is made, production is as simple as in cutting conventional cylindrical gears. This new method minimizes the difficulty of wide variations in backlash experienced with such gears cut by previous methods. Full or modified involute teeth are produced to a higher degree of accuracy than was ever possible before on gears of this type.

Oval and elliptical gears are produced by continuously varying the center distance between cutter and gear during the cutting operation. A contour cam and a follower move the saddle the required amount in timed relationship with the rotation of the eccentric cutter-spindle adapter. The required pitch line contour of the gear is determined by the control cam and the eccentric adapter.

Although the Modified 36-Type Gear Shaper can be used to produce conventional external gears up to 18″ pitch diameter by substituting a cylindrical cam and concentric cutter adapter, it is primarily a special purpose machine for oval and elliptical gears. Special stroke parts are required for cutting face widths from 6″ to 10″. For full information, get in touch with any Fellows office.

THE FELLOWS GEAR SHAPER COMPANY
78 River Street, Springfield, Vermont
Branch Offices: 1048 North Woodward Ave., Royal Oak, Mich.
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Fellows *Gear Production Equipment*

CIRCLE INFORM-A-GRAM KEY NO. 47

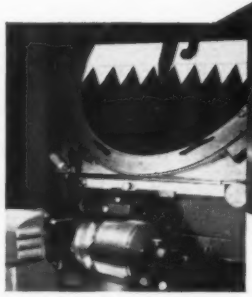
NEW

JONES & LAMSON EXTENDED RANGE OPTICAL COMPARATOR

and Universal Measuring Machine

Again, Jones & Lamson fills a long-standing need by introducing a new Comparator, the FC-30-ER, with 30″ dia. screen. It is designed especially to give *added measuring capacity* (up to 10″ horizontally, 8″ vertically), and *added work capacity* (200 lbs. and more, on a rugged 8″ x 32″ table, supported on precision rolls and twin heavy duty columns).

This new Extended Range J & L Comparator is *the largest standard 30″ Comparator made.* It includes J & L's True Telecentric Optical System, Adjustable High Intensity Illumination and Precision Matched Lenses.



The FC-30-ER, equipped with J&L's NEW Lead Amplifier, affords precise inspection of thread lead to .0001″. The Amplifier produces up to a 500:1 amplification of any lead error in threads ranging from 4 to 70 pitch.

MODEL FC-30-ER

"World's oldest and largest builder of precision optical comparators"

JONES & LAMSON

JONES & LAMSON MACHINE COMPANY, Dept. 710, 519 Clinton Street, Springfield, Vt., U. S. A.

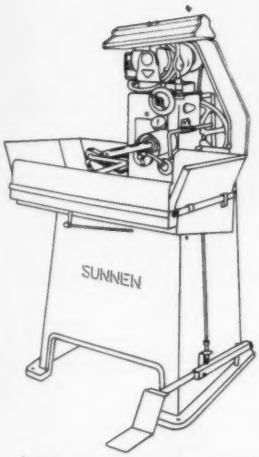
Please send me Comparator Catalog GL5803, which describes the complete line of J&L Optical Comparators.

name _____ title _____ street _____

company _____ city _____ zone _____ state _____

CIRCLE INFORM-A-GRAM KEY NO. 48

HOW WOULD YOU PROCESS THIS TANDEM BORE JOB?



Diameter range of standard honing tools: 1/8" to 2 5/8".

The piece requires a .0002" hole tolerance plus perfect alignment, roundness and straightness of both holes.

The best process for this tough job was Sunnen Honing. The Sunnen Honing tool hones both holes simultaneously . . . the workpiece is self-aligning on the tool. The one honing operation guarantees alignment, identical size and controlled surface finish in both holes.

Sunnen Honing eliminates the problems you have in machining tandem bores by other methods: clamping distortion; jump and chatter of long quills or boring bars; turntable alignment error; inconsistent finish produced by dull tools.

Sunnen Honing easily holds tolerances to .0001" . . . requires no fixtures and assures low cost per part. Average honing machine installation with tooling is around $1,000.

send for five informative

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CIRCLE INFORM-A-GRAM KEY NO. 49

NEW

ERICKSON

MASTER SPACER

with No. 0 Timken Bearings

gives increased production and optimum accuracy in

straddle milling

milling

jig drilling
with either micrometer or "Jo" block setting

inspection

Write for free catalog "Erickson Master Spacer" today. And at the same time request your copy of Catalog K; you'll find cost-slashing applications for all Erickson holding tools.

The new Erickson Master Spacer quickly and accurately positions work for a wide variety of jobs. This *one* tool can eliminate expensive jigs and fixtures . . . makes it a simple procedure to set up drilling, milling, boring and special machining operations.

The new Erickson Master Spacer, ideal for tool room and production machining, assures outstanding performance under heavy helical cuts and slow feeds. *Indexing accuracy guaranteed within .001-inch cumulative error on a 6-inch diameter circle.* Jig drilling is possible with either micrometer or "Jo" block setting. Timken bearing construction permits work to be trued in position with brake off because spindle alignment remains unchanged.

The new Erickson Master Spacer can help you come to grips with your Number One Problem—high production costs. The first step is to get the Erickson story.

AA-5091

ERICKSON TOOL COMPANY

34351-10 Solon Road • Solon, Ohio

COLLET CHUCKS • FLOATING HOLDERS • TAP CHUCKS • TAP HOLDERS • AIR-OPERATED CHUCKS
EXPANDING MANDRELS • EXPANDING-COLLETS • SPECIAL HOLDING FIXTURES

CIRCLE INFORM-A-GRAM KEY NO. 50

PLEASE, MR. FORD . . .

DON'T GO OVERBOARD FOR THE WOMEN — give us mere males a bit of a break while designing and styling your cars.

If pushed, we could probably muster evidence that we pay out 99.44% of the dollars that enable our fair ladies to burn gasoline, park sloppily and wrinkle fenders, all the while we are earning said dollars.

The opportunity for my plea arises from receiving in this morning's mail, your announcement of the upcoming 400-member consumer panel you are sponsoring at Dearborn. You said, "the panel will represent the biggest move in automotive history to establish a consumer sounding board for its products."

Fine! And by the same token, and under the heading of market research, won't it present a unique opportunity to determine whether there aren't sufficient differences in masculine and feminine automotive tastes, desires, prejudices, weaknesses, foibles, and even gripes, for Detroit to capitalize on?

Let's put it another way, also market-wise: As long as we can keep ahead of the Russians by having two cars in every garage, what would you rather see in every garage — an American car and a foreign car OR an American car built for "him" and an American car built for "her". Isn't it about time for Detroit to explore that angle?

With all due respect to the Madison Avenue grey flannel suiters, whose modus operandi is to never underestimate the (spending) power of a woman, there are, you know, quite a few products which thrive on the masculine market alone. I'll admit they're hard to think of, but Aqua-Velva does quite well.

Then there's that snidest merchandising gimmick of all — the play on masculine escapism. Who wouldn't rather buy an automatic dishwasher for the little woman than help with (or do) the dishes? By that same yardstick of masculine escapism, what he-man wants to drive a chromed-up, vari-hued, plaited, crocheted and scented rolling jewel box? Wouldn't he rather have a truly functional but dignified, and highly work-on-able, car with which he could recapture some of the fun of car-owning by being able to tinker with it Sunday mornings? Who wants to have to go on a reducing diet in order to reach the spark plugs? Don't forget that your Grandad's Model T sparked the first great do-it-yourself movement in this country!

If you — meaning Detroit — can come up with a car "for men only", you will have it made; particularly if it could be truly distinctive enough to be marketed as such.

Is it too much to hope that this could markedly stimulate over-all sales? If half the garage is occupied by a "his" car, he can be made very unhappy until he buys a "her" car for the other stall. And conversely, if she has a "her" car, how can she stymie the acquisition of a 'his car" for his little old self?

This would really give Tennessee Ernie something to sell us pea pickers!

You say, "Okay, Pennington, just what constitutes a car 'for men only' "? I think I know, but it still would be only one man's opinion. Next October 8th and 9th, Mr. Ford, you and Dr. George Gallup, the famed public opinion researcher who is working for you on your conference project, will have an unprecedented opportunity to get pertinent answers from the 400 people from 400 cities.

Your question, "Is there a market in this country for a man's car?" in one or more forms and variations there-on, can be tossed out to the panel for brainstorming.

Wouldn't you and your styling, engineering and advertising personnel like to "discover" a new supply of ammunition with which to scatter the foreign car invasion forces?

"His" and "Hers" on the conference agenda might do it, and would have terrific news value!

E. Willard Pennington

editor

New Lamina Wear Plates Last Longer, Cost Less!

Now . . . save money and get better performance wherever you have sliding contact between flat metal parts! The principle of bronze electroplated on a steel backing originated with Lamina Bronze-Plated Guide Pin Bushings. Proven during countless millions of punch press hits, it is now being used successfully to produce flat wear plates.

This new concept in wear plate design combines the low cost, ready machinability and solid backing of steel with the long-wearing, non-seizing, free-running properties of a copper-tin bronze alloy. Lamina Bronze-Plated Wear Plates are flat, parallel, and can be easily machined to suit your application. Standard sizes available from stock. End costly wear problems and reduce expensive downtime now! Write for complete information.

Lamina
DIES AND TOOLS, INC.
P.O. BOX 31, ROYAL OAK, MICHIGAN

MANUFACTURERS OF LAMINA GUIDE PINS, BRONZE-PLATED BUSHINGS AND THE FINEST PRECISION PROGRESSIVE AND LAMINATION DIES.

CIRCLE INFORM-A-GRAM KEY NO. 52

How To Deplate A Rocket Engine *or* Rocket Engines Electrolytically Ground *--for fast metal removal*

as told to
William E. Hoffman
by
E. A. Werner
Machine Shop Branch Chief
Lewis Flight Propulsion Laboratory
NACA, Cleveland, Ohio

Whatever you want to call it, it brings metal to size in 50-60% less time — and to close tolerances — electrically. And you say, "Electrical apparatus is for electrical engineers and electricians. We're mechanical engineers, machinists, and tool makers. We aren't interested." Perhaps you can't afford not to be. Witness through our eyes the use and performance of this *electrical* equipment—as applied with a lathe and grinder attachment—at the Lewis Flight Propulsion Laboratory of NACA (National Advisory Committee for Aeronautics) Cleveland, Ohio.

THE LEWIS FLIGHT PROPULSION LABORATORY recently purchased a 300-amp electrolytic power supply unit from the Anocut Engineering Company, Chicago, Ill. It was first used on a DoAll G-10 Surface Grinder for grinding the "Christmas-tree" form of the root section on jet engine blades. It is now being used on a lathe as an aid to overcome one of the difficult finishing problems created by a new rocket engine design.

After assembly to the degree shown in Figure 1, the rocket engine component is mounted on a mandrel and ground on the outside to close tolerances. First efforts, using conventional grinding equipment, required 120 hrs. Much of this was deburring time — by hand.

In an effort to lower production time, machine shop personnel decided to convert a lathe into an electrolytic "grinder." They chose a 25" Monarch contour turning lathe and mounted a Dumore spindle on the tool post. The quill of the spindle was isolated by its enclosure in an insulating sleeve; this was necessary since it carries a negative charge during electrolytic grinding. The rest of the machine carries the positive charge. To complete the conversion, copper slip-rings were attached to the outboard end of the grinding spindle and to the headstock spindle to carry electric current through heavy-duty brush assemblies. This arrangement on the headstock is to prevent current from passing through bearings of the machine.

In order for the grinding head to follow the workpiece contour, a template was made to be used with the lathe tracer mechanism. Also, an 8" x ¾" x 1¼" metal-bonded non-diamond peripheral (type DIT) wheel, with a ¾" full radius on the periphery is used. The electrolyte is carried to the work through a nozzle.

As the wheel comes into contact with the workpiece, current flows through the system, from positive (workpiece) to negative (grinding wheel) causing an electrolytic or anodic attack on the surface. The bulk of the material is removed by the current and deposited in the electrolyte; only a small amount of metal is removed by the wheel, for sizing.

The engine consists, at this stage, of a number of long channel shapes of pure nickel, open to the OD to form the engine's periphery. The grinding of the fins created by the

Fig. 1. Shown here on a mandrel in a lathe setup is a rocket engine main component of pure nickel, having a 15″ OD. OD grinding is done with the attached head.

legs of these channels is the work being done here. The lathe acts as a large fixture; the only turning of the part is to index it to the next fin in succession.

One 0.040″ thick nickel fin is *now* ground over its contoured length at a feed rate of 6″/min removing 0.035″ to 0.050″ in one pass. The workpiece is supported on the machine centers with no other special clamping, holding fixtures, or driving apparatus (no dogs) being required.

In addition to the increased grinding rate, very significant savings accrue from the fact that the electrolytically ground surface is *absolutely* free from burrs or layover. When the grinding is completed, no further operations are necessary, concentricity is within 0.002″ TIR, an excellent finish results, and tolerances are closer than were possible with conventional grinding.

To "top the cake," a job that formerly required 120 hrs has been reduced to 45 hrs.

NACA is now setting up an identical installation to prepare for additional production demands. In addition, they are examining closely the possibilities of applying electrolytic grinding to other operations involving high-temperature alloys.

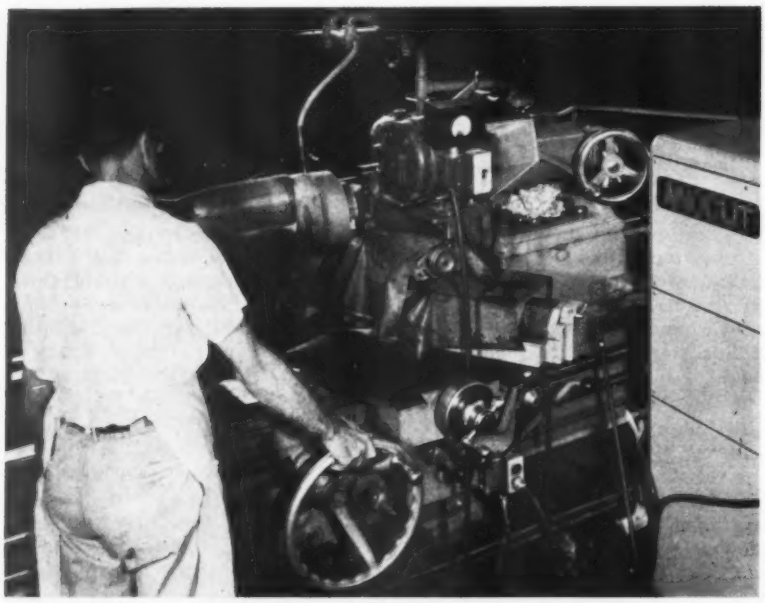


Fig. 2 The Duplicating Lathe, shown from the operator's side, during grinding with the 300-amp electrolytic supply unit.

The Lewis Flight Propulsion Laboratory is one of three major research establishments operated by the National Advisory Committee for Aeronautics. Created by Congress in 1915, NACA is the top aeronautical research organization of the Federal Government. Dr. James H. Doolittle is Chairman of NACA's "board of directors" whose 17 members are appointed by the President of the United States, and serve without pay.

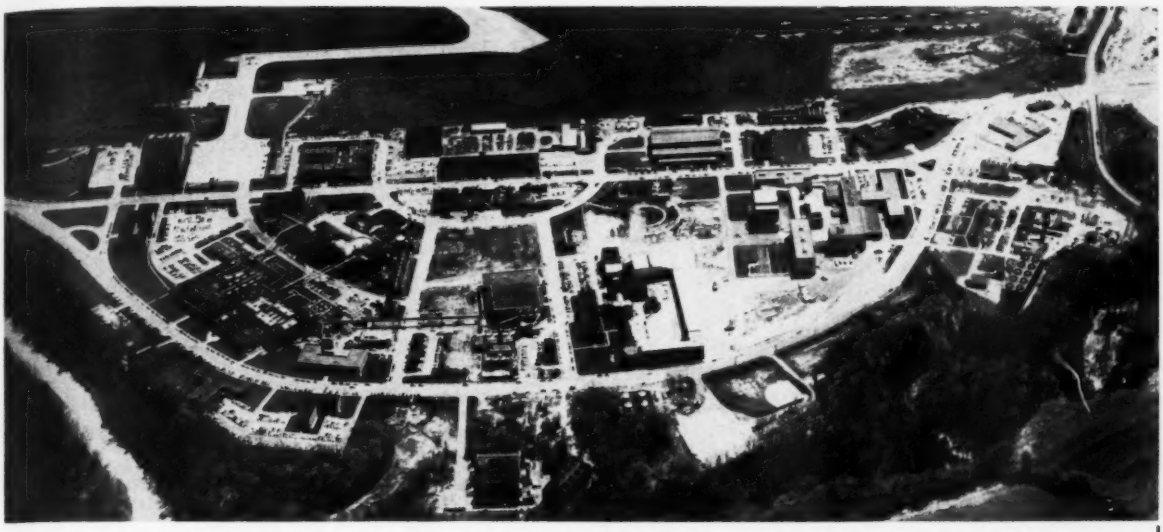
The business of NACA is scientific research in aeronautics directed toward practical solutions of the problems of flight. Scientific knowledge gained here is used by the military services and the aircraft industry in the design and development of improved aircraft and propulsion systems.

To obtain their information, NACA operates Lewis, which was established in 1941 on a 200-acre site adjacent to the Cleveland Hopkins Airport; the Langley Aeronautical Laboratory near Hampton, Virginia; and the Ames Aeronautical Laboratory near San Francisco, California. NACA has smaller facilities at Wallops Island, Virginia, and at Edwards, California. Also, near Sandusky, Ohio, a research reactor facility is used by Lewis scientists to study some of the problems of aircraft nuclear propulsion.

Lewis is primarily engaged in the investigation of aircraft powerplant problems and more than $100-million worth of research facilities are in use at the Laboratory. Turbojet, ramjet, rocket, and nuclear aircraft propulsion systems are studied. Areas of study are: combustion, fuels, propulsion system installation, engine component design, controls, cooling, high-temperature materials, and lubrication.

Under NACA's Director, Dr. Hugh L. Dryden,* whose Headquarters are in Washington, D. C., is Dr. Edward R. Sharp who directs the activities of the 2700-man professional and technical staff at Lewis. Lewis's staff includes research scientists, engineers, technicians,

*NACA will become the nucleus of operations for the NASA (National Aeronautics and Space Administration) sometime in October 1958. This agency will be headed by T. Keith Glennan, whose deputy administrator will be Dr. Hugh L. Dryden.



and other skilled supporting personnel.

Their 10′ x 10′ Supersonic Wind Tunnel passes air through its test section compressed by large compressors which in turn are powered by 250,000 hp electric motors. The air is dried by heat and chemicals at a rate equal to the capacity of about 12,000 home clothes dryers. Its tunnel walls are stainless steel plate and inside activities are monitored by closed circuit televison systems.

Their 8′ x 6′ Supersonic Wind Tunnel is also used for supersonic tests and was recently modernized for transonic operation.

Research scientists utilize these wind tunnels to study fullscale airplane and missile powerplants designed to operate at speeds from 400 to 2500 mph, at simulated altitudes to 30 miles. Their main considerations are investigations into aircraft powerplant air inlet and outlet configurations, nacelle shapes, and the location of engines on aircraft's structures.

Another wind tunnel is used to test full-scale aircraft engines under conditions which simulate pressures and temperatures of altitudes up to 50,000 feet. This tunnel has a 20′ dia test section. Refrigeration equipment requiring 22,000 hp cools the air in the tunnel to -48° F.

Their Propulsion Systems Laboratory contains two altitude chambers for testing high-speed turbojet and ramjet engines under conditions simulating very high altitudes and low temperatures. Engine thrust, fuel consumption, operating temperatures, and other characteristics are measured. These chambers which are 14′ in dia and 100′ long are supplied with air at various pressures, heats, moisture content and temperature, as required. Two small altitude chambers are also used.

Their Engine Research Building occupies 5½ acres and contains about 100 test stands for investigation of *components* of engine propulsion systems. Studies here are conducted on turbojet engine air compressors, combustors, and gas turbines. Unusual environmental conditions can be duplicated.

Their Rocket Laboratory conducts studies of thrust producing devices which carry their own fuel and oxidant that require no external air supply. Various engine configurations, fuel injectors, nozzles, fuel ignition and combustion with a variety of fuels and oxidants, are studied, and their effects on engine thrust is determined.

Their Rocket Engine Research Facility, another division, supplements the work of the Rocket Laboratory. Here practical-sized rocket engines may be used to determine means to effectively use high-energy rocket propellants. Many thrust stands to study propellant supply, storage systems, silencing equipment, and exhaust disposal systems, are used here.

Their High Energy Fuels Laboratory employs high pressure air supply systems, burners, and evacuated exhaust systems to investigate special fuels under various conditions encountered during mixing and burning.

Their Materials and Stresses Laboratory, still another facility, is operated for the purpose of studying materials suitable for use in aircraft engines.

Still another separate Wind Tunnel is used to study aircraft icing problems as they occur at temperatures from atmospheric to -40° F. Water vapors and sprays of various droplet sizes are mixed with the air stream here to simulate actual operation conditions.

All these lab facilities and their findings are integrated by a Central Automatic Data Processing System which transmits raw data, on a 24-hour basis, from major facilities at Lewis. Essential elements of the laboratory-wide system are automatic digital potentiometers (ADP) and digital automatic multiple pressure recorders (DAMPR). This equipment sends data signals to the central automatic digital data encoder (CADDE) where it may be stored or be returned on typewriters or facsimile receivers, as raw data to the control room of the originating facility. Data may also be fed into the ERA 1103 (UNIVAC), "electronic brain," for final calculations of end results in a matter of minutes, rather than in days as is required in manual computations. end

How to Machine Glass Base Laminated Plastic

by E. C. Graesser
Chief Engineer
Quality Control and Standards
NATIONAL VULCANIZED FIBRE COMPANY
Wilmington, Delaware

WHEN GLASS BASE LAMINATED PLASTIC GRADES were developed in the thirties and made available to the market, the volume machining of glass grades caused doubt in many minds — whether they could be machined and if so, how. Most of these doubts have been resolved, but not all.

Although machining of these grades still presents many problems, the steadily increasing need for these glass base grades (because of their flame and heat resistance, higher mechanical strength, and increased moisture resistance) has resulted in the perfection of certain machining practices which prove helpful when handling these materials.

Fig. 1. Sawing a full sheet of glass base laminate with circular saw. Material is fed as fast as saw will cut without forcing.

Fig. 2. Punching glass base material. Sheets up to 3/32" can be punched with good results.

The following basic recommendations for machining should be of interest and found useful, not only to those who are encountering these grades for the first time, but perhaps even to those who have already had some experience in machining glass base laminates.

It is important to bear in mind that we are dealing with laminated materials and the direction of the laminations determines the strength of the finished parts and requires additional care when machining. In many cases, the same machining operations employed in the fabrication of metals and wood may also be adapted to these grades. However, certain slight changes in tools and the use of proper speeds are necessary. The following observations are a result of the writer's 20 years of experience in dealing with glass base grades of Phenolite laminated plastic.

Sawing

A diamond impregnated wheel with copper body 1/16" thick and 12" dia run at 3,000-3,600 rpm will give good results cutting dry with a good exhaust system. The material is fed by hand into the saw as fast as it will cut without forcing the saw. Idling creates friction and heat, which cause excessive dulling and burning. A flood of water on the work and wheel can be used when necessary to pre-

Fig. 3. Drilling glass base laminate part. Carbide drills are used with spindle speed of 4800 rpm for ¼" of drill.

vent overheating. Abrasive wheel cutting under water is also recommended.

Band sawing is one of the most difficult and expensive operations. For good results steel blades with hardened teeth and a soft back can be used. Work should be fed lightly and the blade should be kept sharp. Diamond coated band saw blades are now available and are superior to steel. Sawing can be done dry with a good exhaust system.

Shearing and Slitting

Thicknesses up to 3/32" can be sheared and slit. The same standard practices are used for shearing and slitting laminated plastic sheets.

Fig. 5. Threading, both internal and external, can be done on a lathe. Fine cuts should be taken for best results.

Punching

Punching practices for glass base materials are the standard ones used for laminated plastics generally, although die life is shorter. The use of carboloy and special die steels will help to increase die life. Sheets up to 3/32" in thickness can be punched with good results.

Drilling

When drilling these grades, a carbide drill should be used. The materials can be drilled dry with a good exhaust system to remove dust. A flood of water on the work and drill can be used when necessary to prevent overheating and dulling of drills. High speed drills, nitrate treated, can be used, but must be sharpened more often. Care should be taken when sharpening so that the drill is cut back far enough to the original body diameter of drill. Spindle speed for these grades is 4800 rpm for ¼" diameter of drills.

Tapping and Threading

The methods for tapping these materials are much the same as for tapping paper base laminated plastics. The abrasiveness may cause taps to cut very close to size, resulting in a tendency toward binding when backing out. Standard high speed steel taps can be used on short runs. Any sizeable quantity carbide taps should be used. Taps should be purchased oversize. Coolant can be used, but is not necessary if a good exhaust system is available.

Fig. 4. Tapping operation is much the same as for paper base grades. Coolant can be used, but is not necessary when exhaust system is available.

Threading

External threads and internal threads can be cut on a lathe with a carbide-tipped tool, dry. Fine cuts should be taken to give best results. A coolant can be used, but is not necessary.

Machining

Conventional machining, such as turning, boring, facing and milling of these grades, can be done on automatic screw machines, standard and production lathes, hand turret lathes and standard milling machines. Carbide-tipped tools and cutters should be used with surface speeds below those used

Fig. 6. Turning glass base tubing on standard lathe. Machining operations such as turning, boring, facing and milling can be done on standard metal working machines using carbide-tipped tools and cutters.

for paper base laminated plastics. Tools should be ground with a zero rake and machining can be done dry with an exhaust system to remove the dust. A coolant can be used, but is not necessary.

Today, the demand is more and more for materials that have good heat resistance with mechanical strength, in switch gears, low loss electronic equipment, and for other Class B and Class H insulation. New varieties of resins, including epoxies, silicones, melamines and phenolics, are being introduced. The progress in machining of glass base laminates is timely and countinuing. Techniques are being refined almost daily so that glass base machined parts, though impossible in the recent past, can be turned out with speed and perfection, if operators are kept up to date with new and changing techniques.

end

CENTER—FINDER SAVES LAYOUT AND INSPECTION TIME

ESTABLISHING THE CENTER of machined or cored holes in castings is frequently necessary, particularly when the hole center is to be used as a reference point. One method used for establishing this center point is popularly known as the wood block method and has been utilized for many years.

Recently a new tool has become available that simplifies and speeds up the process of finding hole centers.

A comparison of the utility of these two methods is found at the Ivanhoe Division in Cleveland of Reliance Electric & Engineering Co., where the Quality Control Department inspects all incoming castings used in the manufacture there of electric motors.

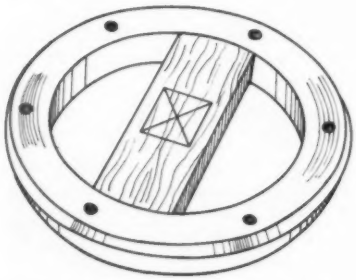


Fig. 1. The wood block method for determining the hole center of bored parts or cored castings is demonstrated in this drawing. After the block has been inserted in the workpiece, a square is laid out on the block with the sides equidistant from the hole edge. Intersection of diagonal lines from opposite corners gives the center point from which a compass can be swung.

Replacement for the old method has been found in the new tool known as the Center-Finder, shown in Figure 2. Its simplicity of operation makes possible a doubling of the number of castings that can be checked in the same period of time.

The Center-Finder consists of a body that encases a 3-lobe cam, a removable center button, three-matched pins, a transfer punch, and clips that fit over the end of the pins. Several sets of matched pins of varying lengths are included that provide the tool with hole capacities ranging from 2½" to 6½" dia.

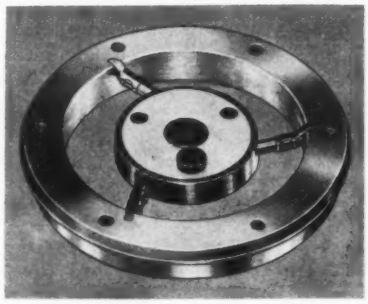


Fig. 2. The Center-Finder is shown located in a workpiece with the clips supporting it in place.

Locating a hole center with this tool is comparatively simple. The three pins are inserted in openings provided in the body of the tool and a clip placed on the end of each pin. These clips hold the tool in place, thus preventing it from falling through the cored hole as shown in Figure 2.

To center the tool, an Allen wrench is inserted through the case into a hex-shaped opening in the cam. By turning the wrench counter clockwise, the three pins, actuated by the cam, will make contact with the inside wall of the hole. This setting is then locked by turning the conveniently placed thumb screw.

The center button of the tool provides the point from which the dividers can be rotated for determining the material available for machining purposes.

Should the job involve a counterbore with a solid bottom, as shown in Figure 3, the center button is removed and the transfer punch inserted in its place. Striking the punch with a hammer accurately registers the center of the counterbore.

The Center-Finder also can be used in inspection and layout work.

Fig. 3. By removing the center button and inserting the transfer punch, the center of a counterbore is registered by a tap of a hammer.

DRILL POINTING - 1958

Abstract from a German paper, and additions by William E. Hoffman, Associate Editor. The paper, "Werkstatt Und Betrieb," was furnished by the Alina Corporation.

Can you finish these views? Draw in the drill configuration that will best accomplish your present drilling problem. Could you produce it, or sharpen it, on your present grinding equipment? If you can do both — draw it and produce it — this article is not for you. But if you can only do one or the other, we invite you to become acquainted with drill types and some new drill grinding equipment through this article.

Perhaps your problems are not with drilling? Three of the many grinders and adaptors will be discussed later, and they grind other cutting tools too.

WHY A MECHANICAL GRIND

SKILLED WORKERS KNOW that the efficiency and life of a twist drill, as well as the accuracy and quality of the work in drilling, depends first on the accuracy of the tool — other things being equal. Once the form and angles on a twist drill have been established for a particular job it is necessary that they be repeated in production. It is taken for granted that these forms and angles can be measured in order that they may be repeated.

Although a man can produce useful results by hand grinding, it is seldom possible to make the most of a twist drill when ground in this manner; and in spite of gages, it is not possible to avoid entirely small, but important, errors. These small significant deviations usually lower tool performance, reduce the quality of the work, and increase the danger of drill breakage. Investigations have shown that over 80% of all drill breakage is due to poor grinding. So, ground tools having less faults can only be had mechanically.

Performance and quality of work can be raised, if cutting tool geometry is optimum and if tools are replaced by others of equal performance. So then, drill grinding machines, in addition to being versatile and precise, must be adjustable in such a way that their settings can be made easily, and by small increments. Often it is necessary to determine through trial and error the values which will give the best performance for the work to be done. For example, it should be possible to change a point angle of 118° to 117° 30′.

The most important features of a drill will now be reviewed in order to establish a clear picture of what is involved in this effort toward drill refinement and better performance.

Elements of a Twist Drill

The most common drill point has a cone-surface for lip clearance. In grinding this the drill moves past the grinding wheel in such a way that the *lip* clearance becomes conic. On a two-lip drill the two cone axes must be made to deviate from one another so that each of the cutting edges or lips will receive clearance. For uniform cutting the same clearance is necessary on both lips and these cone axes must be offset by equal amounts.

In grinding the twist drill, the most important elements are: the point angle "a"; the lip clearance "b", or relief angle; and the chisel edge angles "c". See Figure 1. Special grinds or grinding methods such as thinning the web, and correcting or modifying the lip, will be discussed later.

Along with the cone-surfaced grind, the double-clearance grind has assumed a certain importance. This grind has the lip clearance surface of the twist drill divided into two parts, as is seen in Figure 2

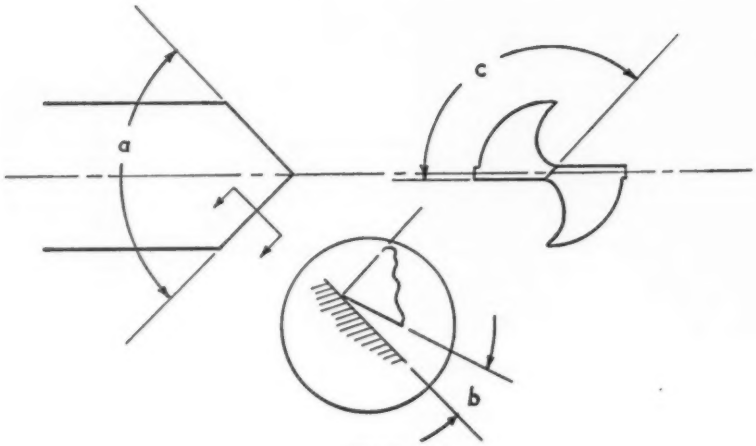


FIGURE 1.

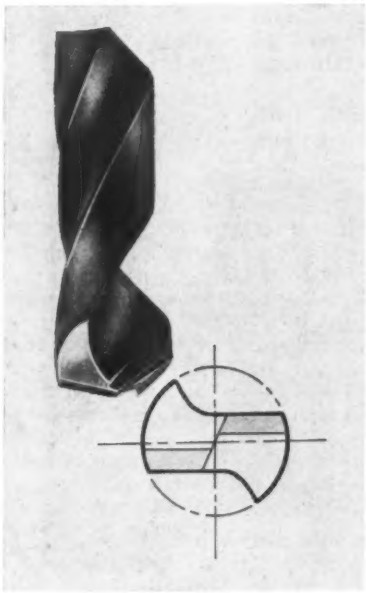


FIGURE 2.

(thinning has also been added). Compared with a cone grind, this lip clearance is measured on two relief surfaces — a primary and a secondary.

In the grinding of very small diameter drills, a performance increase is to be gained by the use of this double-clearance grind, but the trouble to achieve it on small drills is *usually* not worth the advantage over and above the use of a conventional clearance. The lip clearance surface obtained with the conventional flat grind must, of course, have a definite angle, so that clearance results and the drill can penetrate the work.

In addition to the above mentioned grinding methods, "screw-type" grinds are occasionally employed. These, however, may weaken the cutting edges or lips of a twist drill. A distorted screw surface which *does not* weaken the cutting edge as much, and has a diminishing lead toward the center, is the well known Oliver grind, which produces equal clearance angles at the chisel edge.

Twist Drill Requirements

In order to evaluate fully the worth of a twist drill grinder, consideration should be given not only to the precision adjustments provided, but also to its ability to handle other types of related grinding operations.

Figure 3 shows the configuration of a twist drill ground in the conventional manner, in which the lip clearance surface is formed as the surface of a cone. This grind is completely adequate for most conventional work, and is most frequently used. If it is to be ground by hand, an effort should be made to achieve a cone-shaped clearance surface, and a point angle between 116° and 120° (correct for steel).

In Figure 4, the web of the twist drill has been slightly thinned.

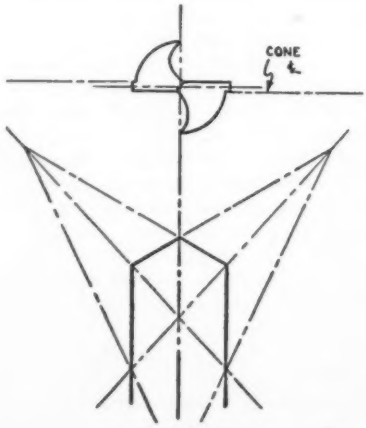


FIGURE 3.

There are a variety of thinned-web points that differ considerably, but in every case the attempt is to improve conditions at the chisel edge — to shorten it, permitting better penetration. In Figure 4, thinning was also employed to obtain a central position for the web relative to the main cutting edges of the lips. This is particularly important with drills of large diameter, because their webs are frequently located off-center. An off-center web is usually not a detriment to tool performance — if the tool is ground properly. Off-center conditions of 0.0003″ are not uncommon in normal manufacturing procedure. To correct this, the web must be thinned. If this correction were not made, the drill might run to one side, producing an oversize hole.

Web thinning also results in a removal of the corner between the chisel edge and main cutting lip. This thinning offers a particular advantage for drills which have been shortened by repeated grindings, since web thickness increases as the chisel edge approaches the shank end.

Beside a considerable expenditure of power from scraping with a chisel point — other than chip formation — it is difficult to get these "scrapings" into the flutes and upward. This is because they are first pushed onto the lip clearance surface, and from there into the flute.

Of course, the amount of thinning should be varied as needed. If thinning is carried too far the chisel edge will be weakened and break away easily; thus, drill life is shortened.

This correction can also bring about a change in the helix angle. For hard and brittle materials, the helix angle should be smaller, for soft materials larger. Too large a helix angle is not advisable, as it hollows out and weakens the cutting edge.

In addition to right hand twist drills (for clockwise rotation), left hand drills are required — especially for "automatics." All details and grinding operations pertaining to one hand applies correspondingly to the other hand.

A drill for plastics is shown in Figure 5. This slender point is also suitable for hard rubber and injection or pressure molded plastics. Interestingly enough, it also does a good job in marble and other like materials.

Experiments and research show that a special grind, to produce cut-

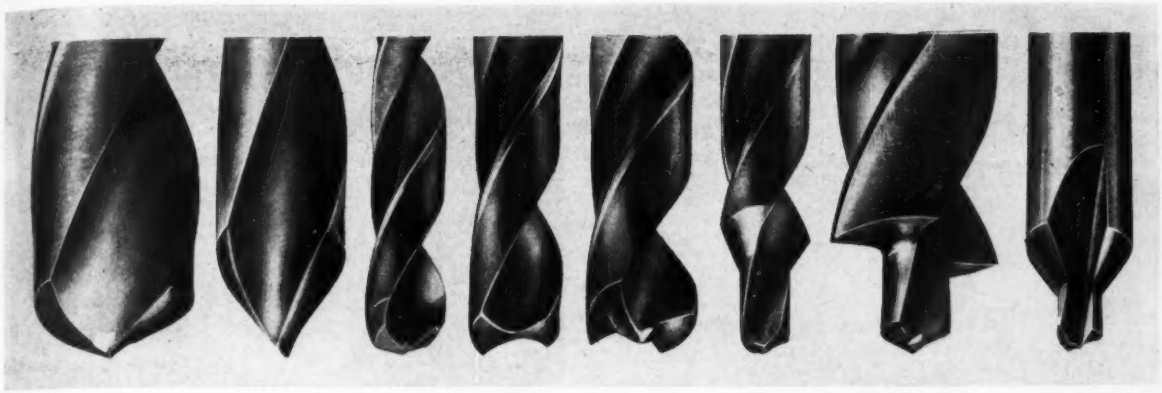


FIGURE 4. FIGURE 5. FIGURE 6. FIGURE 7. FIGURE 8. FIGURE 9. FIGURE 10. FIGURE 11.

ting edges as shown in Figure 6, will result in long tool life when drilling cast iron. Grinding this point free-hand is not a simple matter, nor can it be carried out on the usual drill grinding devices. Because of this it has been used very little. The secondary point angle is usually ground under 60°, and in general, when working cast iron it is necessary to keep in mind that lower cutting speeds are used with increased feeds, as compared to drilling steel.

For special work such as the finish drilling of a hole already started, a point angle of 180° (Fig. 7) may give a closer hole tolerance and finish.

For the drilling of soft metals (lead for example), it is difficult to have success with a conventional grind — oval or angular holes result. However, if the twist drill is ground with a spur point, as in Figure 8, the point will guide the drill. Spur points are also advantageous when drilling sheet metal, and can be thinned in the web for even more favorable cutting conditions.

Other Tool Grinding

Aside from the grinding of twist drills, there are other jobs which require versatile machines for their production if they are to be made in good time; for instance, the making of piloted counterbores and countersinks from old tools in the shop, is a common practice—usually ending in a saving. The anticipated time requirement for making such tools must not be too great, however, or a standard stock tool might just as well be purchased. Also the efficiency of the shopmade tool must approach that of a standard tool.

One big advantage in the use of such tools (piloted counterbores, say) in comparison to stock or commercial tools, is that the drilling of the pilot hole is eliminated. The pilot of the shopmade counterbore or countersink serves the purpose. Figure 9 shows such a tool, intended for drilling and countersinking.

With the cutting tools previously described in which the pilot is ground to work as a drill, a certain disadvantage exists. This being that the chips generated at the cutting edges of the pilot pass out the same flutes as those produced by the countersink or counterbore section, and they may collide, and cause difficulties. This difficulty is especially noticeable during transfer machine production — here efficiency must be consistent. For this reason, manufacturers have developed tools with additional independent flutes to facilitate the flow of chips from the various cutting edges.

In Figure 10, a piloted counterbore is shown. Here, the pilot often has its sharp flute edges rounded off to avoid cutting with them and enlarging the pilot. It is also possible to grind the pilot as a drill.

The cutting edges of the pilot end can be modified to suit and the web thinned as required. This results in additional useful service from drill stubs with a wide chisel edge.

Other innovations and numerous shapes, can be made on the proper equipment, for example see Figure 11. Also to be ground are end mills, deep-hole drills, multi-fluted cutting tools, engraving cutters and taps. There are many grinders available for these jobs; examples of three late grinder developments, that boast unusual ability, are to follow.

Photos in the preceding section courtesy of Alina Corporation.

THE SPIRAL POINT "GENERATOR"

In practice, one end of the chisel edge of a chisel point drill is often slightly more advanced than the other, due to small imperfections in grinding symmetry. As a consequence, the chisel point drill tends to walk to one side or the other of the desired hole location unless the work is first center punched, or the drill restrained by guide bushings. Another limitation is the poor cutting action near the center of the drill, due to the large negative rake angle of the advancing face of this area. This has been discussed previously.

Evidence of the inefficient cutting action at the center of the chisel point drill can be seen in Figure 1.

To overcome the limitations of the chisel point drill, improvements are needed in several areas. The center must be such that it provides a true self-centering action. The large negative rake angle at the center must be reduced and a proper clearance angle provided along the entire surface of the cutting edge. It appears that these improvements are incorporated in the new drill point, called the spiral point.

The spiral point drill has the entire flank surface formed as a three dimensional spiral surface, extending from the axis of the drill to its periphery. Because of this the drill has a true point. It also has a free cutting action close to the axis,

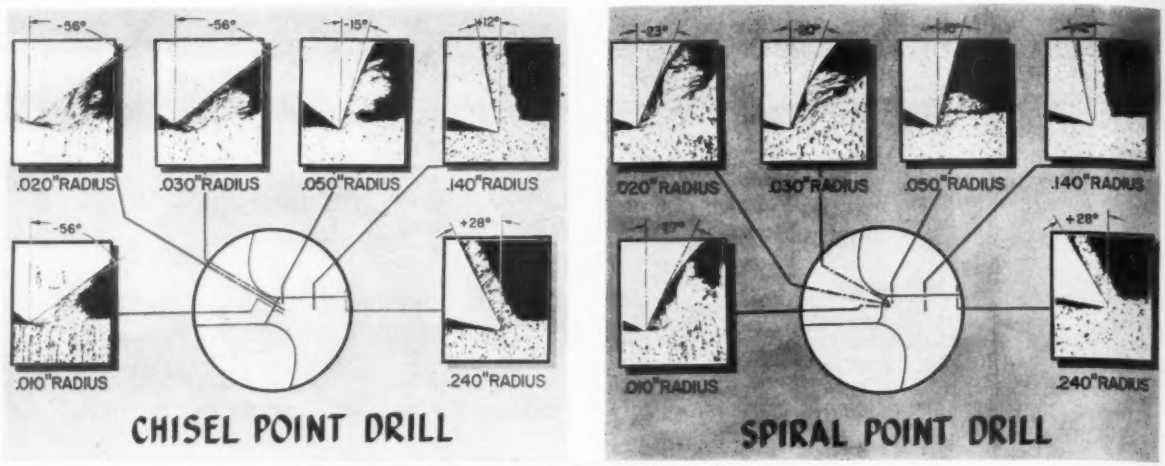


Fig. 1. Here, a comparison is shown between the cutting action and efficiency of the chisel point drill and the spiral point drill.

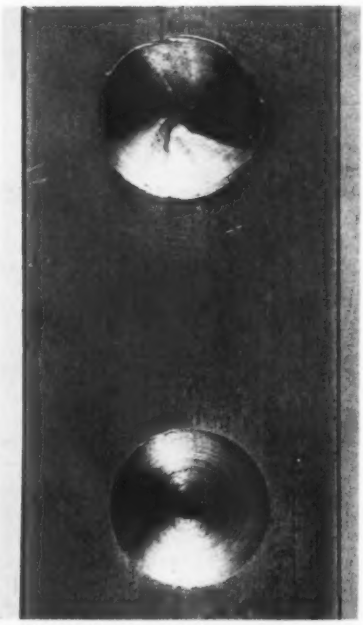


Fig. 2. Here spot drilled holes show the results after the use of a chisel point drill (top) and the spiral point drill (bottom).

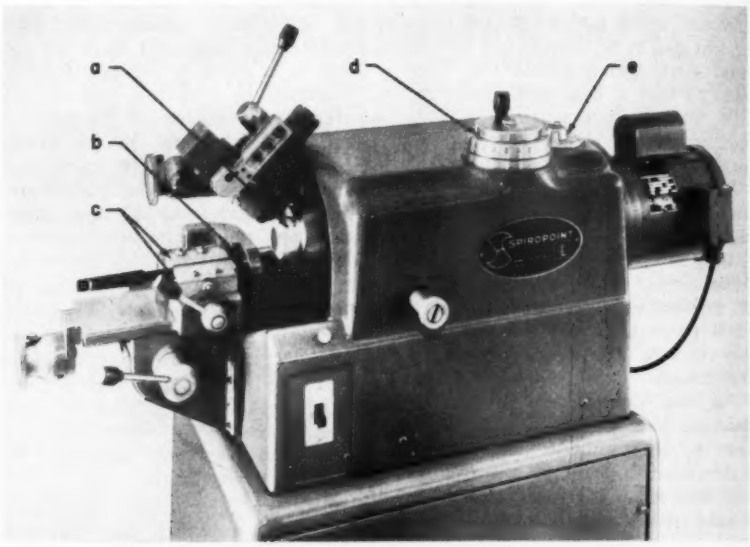


Fig. 3. Shown here is the Spiropoint Drill Sharpener that generates the spiral point on a standard twist drill.

as can be seen in Figure 2; a comparison of views in Figure 1 shows why this is so and that the rake angle is much less negative close to the axis of the spiral point drill, the shear angle is higher, and that the chip space ahead of the tool is much greater. One of the main features of this drill point configuration is its superior centering action; we are told it also eliminates a bell-mouthed condition common in holes drilled with a chisel point. Hole size is improved, as well as a reduction in thrust values — they say from 15% to 34% lower than those for the chisel point drill.

Aside from other advantages this particular point offers greater life per grind, as shown in the case histories boxed below.

By modifying the point angle from 118° to 180°, the spiral point drill may be used to excellent advantage for sheet metal. Burrs are eliminated as well as "grab" when the drill breaks through.

In order to make the spiral point, a machine is required which will grind this geometry accurately and economically. This machine, the "Spiropoint" drill sharpener, is shown in Figure 3. In the use of this machine, offered by the Cincinnati Lathe and Tool Company, the drill is held stationary, while the generating system gyrates around it.

The small grinding wheel (a) is mounted in a rotatable carrier arranged so that the desired shape is generated on the end of the drill as the grinding wheel gyrates around the drill axis. An adjustable truing device is provided for the grinding wheel so that the point angle of the drill may readily be varied from about 90° to 180°.

In operation, the drill is oriented against a retractable control bush-

MACHINE	PART	MATERIAL	DRILL DIA	SPEED	FEED	AV. NO. PARTS/GRIND CHISEL PT.	SPIRAL PT.
Automatic Nut Drilling Machine	Nut	SAE 8650	21/64"	800 rpm	0.005"/rev.	275	1700
Automatic Drilling Machine	Master Cyl. Block	CI	25/32"	405 rpm	0.006"/rev.	1500	3000

ing (b) and clamped in the jaws (c). It is then advanced so as to engage the continuously gyrating grinding wheel until the desired amount of stock has been removed. The entire sharpening operation is very rapid. A simple dial-indicated adjustment (d) provides the correct combination of radial and axial motions for the size drill being sharpened. Adjustment for values of relief above or below the standard amount (to meet special requirements) may be provided by rotating the second adjustable dial (e).

We are told that extensive shop trials and tests with the spiral point drill have produced conclusive gratifying results. It is indicated that the new point geometry constitutes a significant contribution to drilling practice . . . both from the viewpoint of improved quality, accuracy of holes, and higher production. With the Spiropoint grinder, this three-dimensional spiral form can now be generated at a cost no higher than that for producing the conventional chisel point.

THE HELIXPOINT "GENERATOR"

The new Helixpoint drill point is reported to greatly extend tool life and increase production, and to be produced easily with a low cost fixture on any surface grinder or tool grinder.

The new drill point is developed on the Steptool Relief Grinding Fixture manufactured by Steptool Corporation of Los Angeles, Cal. This point can be economically made on a production basis.

The main advantage of a drill ground with a helix point is its self-centering ability; it has a built-in center-drill action without a tendency to "walk". The drill remains steady in the hole as drilling progresses, offering no side displacement. The results of its use are round accurate holes free from "bellmouth". In many cases it is not necessary to center drill, or center punch, and there is no need for expensive drill bushings to maintain accurate center locations. The use of Helixpoint drills eliminates unnecessary operations, reduces machining time, permits faster speeds and feeds, and greatly reduces the cost of tooling and fixturing.

In practical tests for most applications, the Helixpoint has been found to have a free shear action. Torque differences however, are negligible between Helixpoint drills and conventional drills, since practically equal volumes of metal are removed for a given size drill. The free cutting action of this point is due to the leading cutting edges being far less negative in their pressure areas at the point; and the relief area close to the apex has a hollow contoured space for chips.

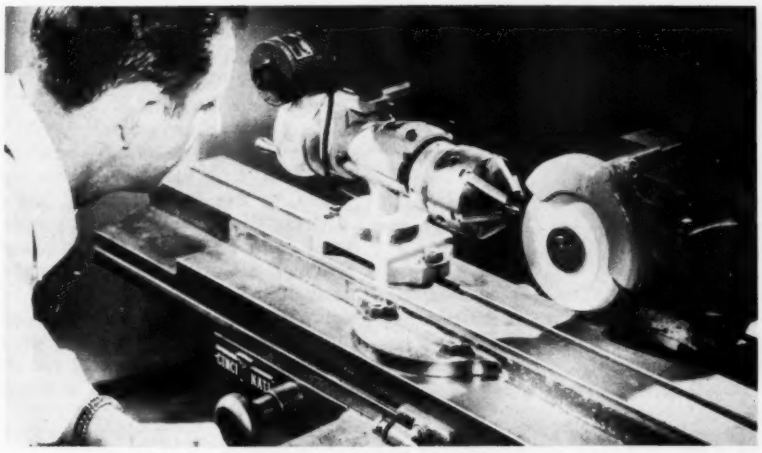


Fig. 1. A Helixpoint Relief Grinding Fixture in action.

Hole accuracy is greatly improved due to centering action and the precision accuracy ground into the point; lip concentricity, and indexing, can be held within 0.0003". Optimum contouring often results in the elimination of reaming, core drilling or subsequent operations to obtain accuracy and finish.

The Steptool Relief Grinding Fixture and proper grinding technique permit an unlimited variety of Helixpoint configurations and clearance angles. Helixpoint configurations can be divided roughly into three general classifications: 1) normal Helixpoint, for general purpose drilling; 2) extreme Helixpoint, for aluminum and nonferrous materials (including plastics); and 3) moderate Helixpoint, for tough steel and iron.

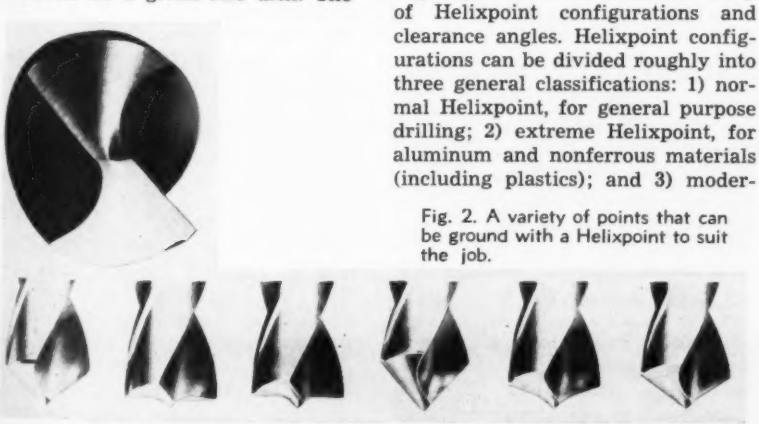


Fig. 2. A variety of points that can be ground with a Helixpoint to suit the job.

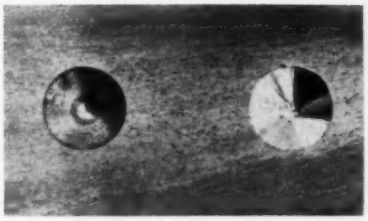


Fig. 3. Illustrates the improvement of hole geometry as experienced with a chisel point drill (left) and a Helixpoint drill (right).

Other shapes that can be used for specific drilling applications are: the sheet metal point, the trepan or spur-point, or the protected corner point.

Point angles can be varied from extremely long points to beyond 180° angle points, and are arranged by adjusting a single clearance cam — the only one on the fixture — which is infinitely adjustable. This cam is the same for either right or left hand drills.

Drills from 0.0135" dia through 1 1/16" dia can be sharpened, since the hollow spindle accepts a 1" dia drill clear through. With the six-jaw chuck, drills ranging from No. 50 to 1" dia are accommodated without the use of collets. The same

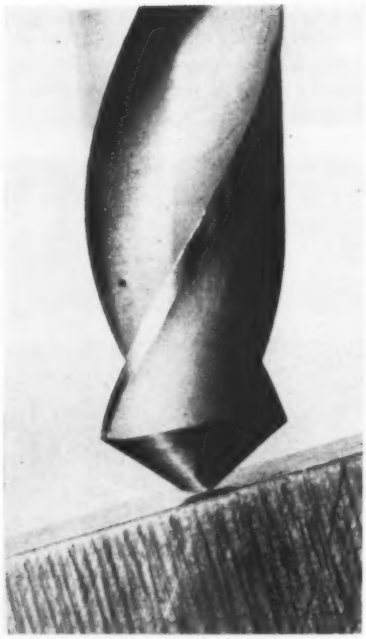


Fig. 4. Demonstrates that a Helixpoint drill can approach work at an angle with less tendency to walk. A chisel point drill will walk even when drilling straight in.

chuck will also handle stub drills up to 1⅝" dia or larger capacity chucks may be used.

Provision is made to allow sharpening drills having from 2 to 24 flutes, including all odd numbers. Arrangement for an appropriate number of flutes requires only the use of the right index hub with appropriate pins. Hub accuracy is within 0.0002.

An unskilled operator can be taught to grind Helixpoints in one hour. Any experienced machinist or grinding hand can sharpen Helixpoint drills within ten minutes. The average rate of resharpening is from 150/hr for the ⅛" dia to 85/hr for a ¾" dia size.

Helixpoints are ground with a simple routine grinding technique based on four steps: 1) dress the wheel to the desired point angle, 2) dress the wheel corner to a desired radius using a Radius Gage, 3) chuck the drill in the proper position with the Lip Positioner, 4) approach the wheel from the side and above center with the cross slide set to strike the wheel for the type of point desired — extreme, moderate, or normal. This procedure soon becomes second nature to the operator.

CASE HISTORY

Company:	Parker Aircraft Company
Part:	Hydraulic Sleeve Valve
Material:	52100 Stainless Steel
Machine:	5 Spindle Natco

	Former	Present
Tools:	HSS ⅜" dia chisel points	Helixpoints
Feed:	1"/min	2"/min
Speed:	400 rpm	400 rpm
Production:	13/hr	35/hr
Pieces/ Sharpening:	26 pcs	308 pcs

The Steptool Relief Grinding Fixture also grinds core drills, step drills, taps, countersinks, etc. By pulling a pin the cam can be disengaged for circle grinding without cam action — for grinding pilots and for indicating concentricity.

THE SELECT-O-POINT "GENERATOR"

Newly developed, the Alina Select-O-Point Machine 2-32, recently introduced in this country by the Alina Corporation of Mineola, New York, follows completely new paths in its essential construction. In spite of its versatility, its special characteristic is its simplicity of operation and faculty for quick conversion to any desired work.

Fig. 1. The Versatile Selecto-Point Twist Drill Grinder.

Many different types of grinding can be done with this machine. For example, the radial relief grind can be applied to either two fluted drills or multi-fluted drills having either a right or left hand twist. In one setup, and with the same grinding wheel, you may split the point, thin the web and/or correct the cutting edge. Further, you may apply the ingenious Select-O-Point four flat grind introduced with Select-O-Point model 03-6. Spot facing cutters may also be made from the solid in a single clamping, or any desired angle applied to a countersink. In addition, the machine may be used for general tool sharpening. Examples might be: sharpening gun drills, sharpening engraving needles, sharpening keyway milling cutters, relief grinding of taps, etc.

In order to make a twist drill suitable for specific performance, the included angle, the relief angle, and the position of the chisel edge must all be suited to each other as well as suitable for the material to be drilled. The Alina Select-O-Point machine can accommodate all these settings — and, they can be made independently.

A novel chuck, with stepless clamping, handles any diameter by the use of a set of reduction jaws. The chuck is arranged to permit the clamping of any length of cylindrical workpiece, and is not affected in any way by a steep helix angle — such as is found on aluminum or plastics drills.

In operation the machine causes a drill to make all the movements needed for producing the desired cutting element configurations. By a continuous rotating movement of the workpiece, its cutting edges are alternately sharpened at each pass on the grinding wheel. This produces accurate concentric grinding.

The actual relief grinding movement is resolved into a horizontal and a vertical "resultant", produced by two overlapping rocking movements of the tool carrier. These movements are arranged for by a single handcrank. The setting and approach of the tool is controlled by indexing stops, a setting coupling, and an approach spindle. They say that the instructional symbols appliqued on the machine, to indicate motion, simplify setup and that the different grinding possibilities can easily be carried out by unskilled persons — quickly and with cer-

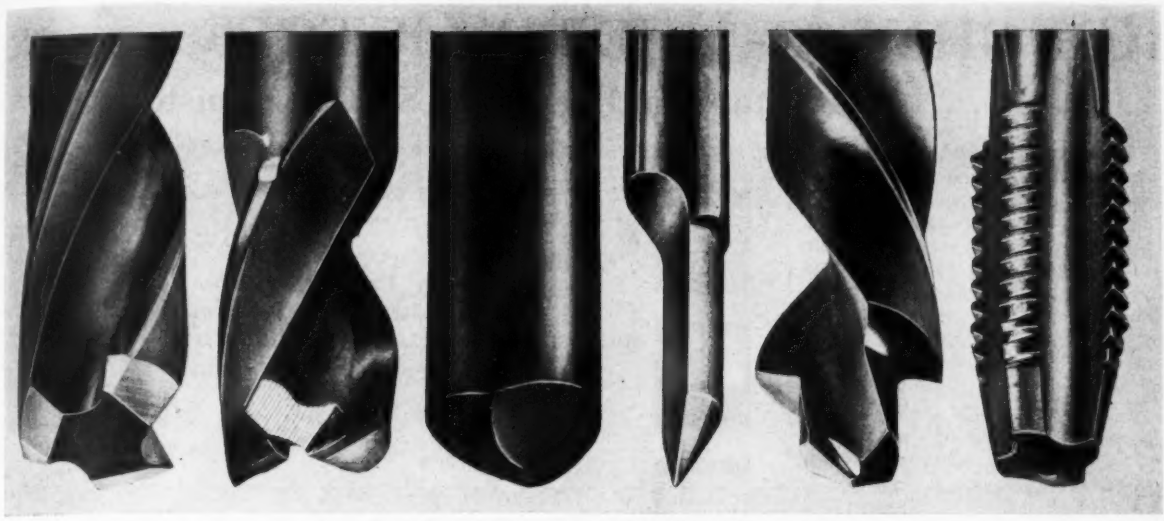


Fig. 2. A few of the cutting tool configurations, other than the twist drill, that can be handled on this grinder.

tainty. An additional movement, not mentioned above, can be imparted to the grinding wheel by means of a hand-wheel that activates a worm gear.

For the most part, the grinding wheel, fixed on the end of the motor shaft with a balancing flange, grinds with its side face, but for some grinding the periphery is used. Truing the grinding wheel on the machine is swiftly accomplished with a diamond dressing tool. Once trued, grinding wheels may be interchanged without the necessity of trying them again. Because of the ingenious patented method, wheels of different hardnesses and shapes can be employed, and readily mounted in a few seconds.

The sturdy stand, which rests on three points, contains centrally located electrical equipment and an electrically driven coolant pump. A coolant tank that can easily be removed for cleaning is provided. A hinged door on the base, provides access to tools and accessory space. Splash guards allow for ample coolant flow.

SPECIFICATIONS

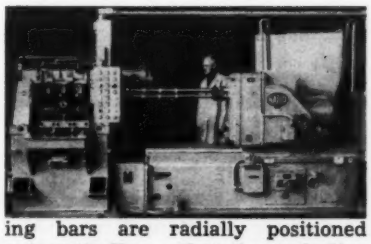
Work range, diameters	3/32"—1-1¼"
Taper shanks	Morse Taper 1, 2, 3
Length	Any length
Include angle	0° to 180°
Lip clearance angle	
A—Radical relief	0° to 15°
B—4 Flat Grind	0° to 30°
Chisel angle	55°
Grinding wheel diameter	5-⅞"
Cup depth	1"
Face width	1.5"
Motor speed	3300 rpm
HP	1/3
Three-phase	220V-440V

By a single switch, the machine is put into service in either direction of rotation and motor protecting switches prevent the main drive, and the coolant pump, from being overloaded. The work is illuminated by means of an adjustable lamp. All shafts are mounted in ball bearings, and the parts most subject to wear are hardened. Bearings and gear parts are protected by suitable seals against the entry of grinding dust or coolant.

UNIQUE MECHANISM SOLVES WORK LOCATING PROBLEM

A unique method is used by this automatic Natco to finish-bore cam and crank bearings in automotive cylinder blocks. The problem is created by the need to pass boring bars and their tools through bushings which support the bars and through the previously machined bores. Here is how it is solved by this horizontal boring machine built by National Automatic Tool Co.

The block is delivered by conveyor to the fixture, where it is first elevated to line up approximately with the bushings. The boring bars are radially positioned automatically so that the tools line up with clearance slots in the bushings as the bars move in. At this stage, the block is positioned so that the bars move through the bores off-center, allowing the cutting tools to pass through without marking the part.



When the bars are in place, the block is finally positioned over locating pins up against a face so that tools are lined up properly for cutting. After the cuts are completed, the entire procedure is reversed and the boring bars are retracted.

About 58 parts/hr can be processed by the machine. Ways are hardened and ground steel, and are automatically lubricated. The head is an 18" x 22" ball bearing cluster box with two helical geared spindles which power the boring bars.

ROUGHNESS-WIDTH CUTOFF

. . . Is Important in Measuring Surface Finish

by Fritz A. Zander
Executive Vice President
MICROMETRICAL MANUFACTURING CO.
Ann Arbor, Mich.

The term "Roughness-Width Cutoff" is attracting the attention of surface-finish-minded people everywhere, but surprisingly enough, many seem to have only a superficial understanding of its full meaning. Here's a clarification of the subject.

BEFORE AN EXPLANATION OF ROUGHNESS-WIDTH CUTOFF can be understood properly, it is necessary that the reader have a general knowledge of surface finish measuring instruments and the principles involved in their operation. Figure 1 shows standard equipment in operation measuring a small ID. This equipment meets or exceeds all requirements of the American Standard on Surface Roughness, Waviness, and Lay, which hereafter shall be referred to as ASA B46. 1-1955.

In general, instrumentation for the measurement of surface roughness is composed of the following basic units: A tracer, an amplimeter, and a mototrace. The tracer is an electro-magnetic unit with a diamond stylus. It follows the surface, transmitting electrical impulses to the amplimeter by means of a flexible cable. The amplimeter is electronically designed to integrate, average, and amplify the voltage produced by the tracer. The mototrace is a mechanical reciprocating unit for piloting the tracer over the surface at a steady rate of speed. The standard type units pictured in Figure 1 provide for measuring roughness in either R.M.S. or Arithmetical Average units and can be read directly from a micro-inch meter installed conveniently on the instrument panel.

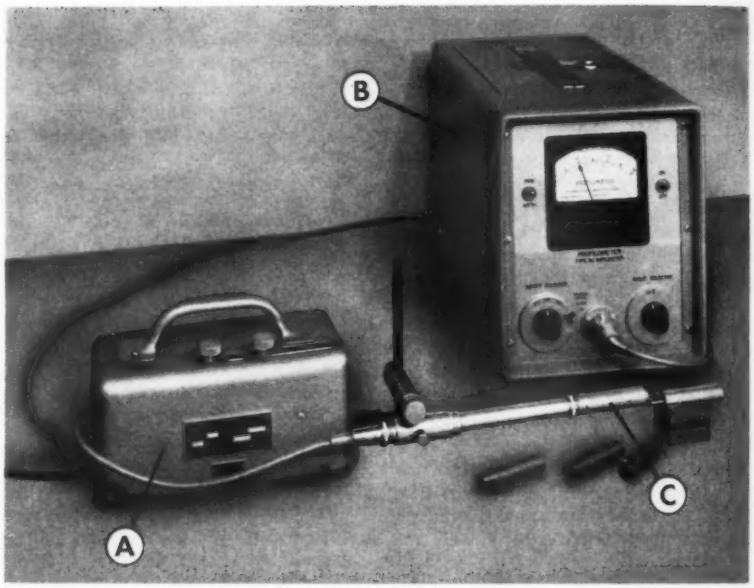


Fig. 1. Equipment for measuring roughness, including (a) mototrace, (b) amplimeter, and (c) tracer.

As a starting point for an explanation of Roughness-Width Cutoff, analyze each of the three words separately: The ASA B46. 1-1955 defines roughness as "Relatively finely spaced surface irregularities, the height, width, and direction of which establish the predominant surface pattern. Irregularities produced by cutting edges and machine tool feed may be considered roughness."

Width is generally thought of in terms of horizontal measurement as opposed to vertical measurement. Again quoting from the Standard, with reference to roughness, "The width is rated in inches as the maximum permissible spacing between repetitive units of the surface pattern." Cutoff carries the implication of severance or division.

Now consider the definition of the words roughness and width and add them to the definition of cutoff and get the Standard definition of Roughness-Width Cutoff:

> "The maximum width in inches of surface irregularities to be included in the measurement of roughness height."

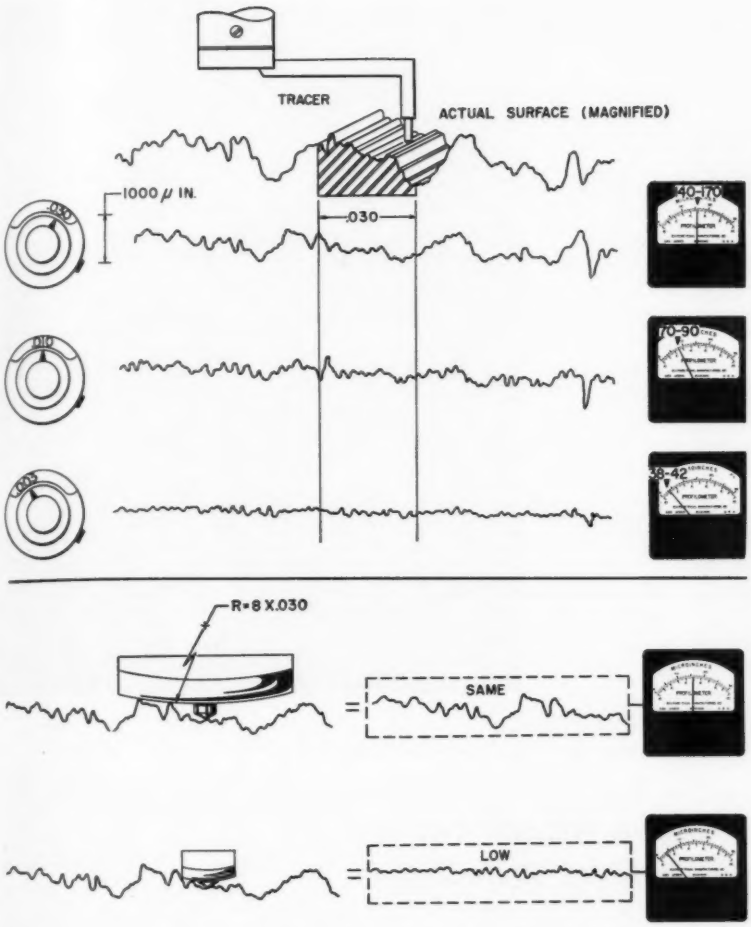


Fig. 3. Different readings that occur when skids of varying radii are used to measure the same surface.

As a means of further clarification, consider the effects of amplimeter cutoff on roughness height as illustrated in Figure 2. Here is shown the total surface face profile that can normally be expected from using a given Roughness-Width Cutoff value. Of course the total surface profile does not actually change because we have agreed to use a certain Roughness-Width Cutoff setting on the amplimeter. By adjusting the cutoff selector knobs to the desired value, however, you are actually telling the amplimeter to consider certain irregularities and ignore all others.

This is done because extensive experimentation has proved that the part being measured will function most economically and efficiently when the roughness width is controlled within a given cutoff band. It has also been found that lesser

Fig. 2. Total surface face profile that can be expected from using given Roughness-Width Cutoff values.

spacing between surface irregularities has little or no appreciable effect on the proper functioning of the part in the assembled unit. Therefore, although the tracer feeds impulses representing the total surface profile into the amplimeter, the average roughness value which can be read directly from the meter is the result of the filtering action of the amplimeter as controlled by the cutoff selector.

In working out the proper circuitry for filtering out various Roughness-Width Cutoff values, it is necessary to take several factors into consideration. Among the most important are the speed of trace and the cycles per second of the amplimeter. The formula for working out the Roughness-Width Cutoff value is:

$$\frac{\text{Speed of trace in in./sec}}{\text{Cycles/sec of Amplimeter}} = \text{Roughness-Width Cutoff included in reading}$$

Another important consideration in the measurement of surface finish is the effect of skid radius on the meter reading. Figure 3 shows the difference in readings that occur when skids of varying radii are used in measuring the same surface.

Although waviness has been mentioned in trying to clarify the meaning of roughness, we have not actually defined the word. The fact that machined surfaces are wavy as well as rough is one of the big reasons underlying the need for specifying Roughness-Width Cutoff. According to the Standard, waviness is defined as "Irregularities of the nominal surface which are of greater spacing or width than roughness." The width is rated in inches as the spacing of adjacent waves. The height is rated in inches as the peak-to-valley distance.

Figure 4 shows a chart record of three different profiles taken over

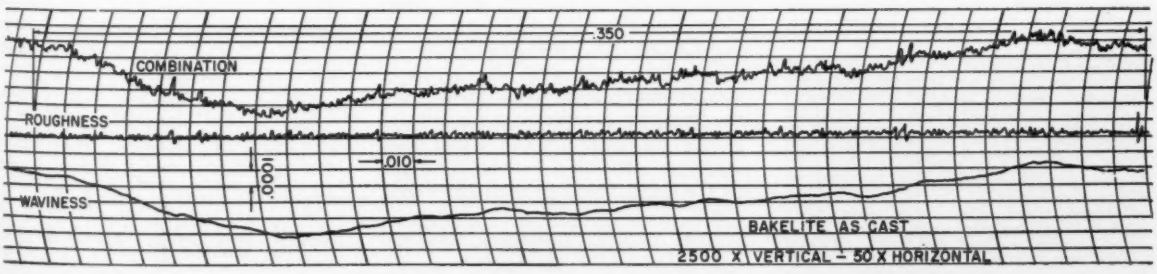


Fig. 4. Three different profiles—combination, roughness, and waviness—taken over the same surface by an instrument with a Roughness-Width Cutoff setting of 0.010".

the same surface by an instrument (Fig. 5) with a Roughness-Width Cutoff setting of 0.010". The combination profile as illustrated on the chart is commonly referred to as the total profile. The middle profile shows only roughness. This has been obtained by filtering out all irregularities but those in the lower limits of the 0.010" Roughness-Width Cutoff band. The bottom profile showing only waviness has been made by filtering out all minor irregularities and considering only those in the high limits of the 0.010" Roughness-Width Cutoff band.

By means of electronic circuitry, engineers have been able to design an instrument that will consider surface irregularities of a certain spacing and disregard all others. Instruments are now available which will consider irregularity spacings (Roughness-Width Cutoff values) up to and including 0.003", 0.010", 0.030", and 0.100". The ASA B46. 1-1955 recommends the use of the 0.030" value for surfaces unless otherwise specified. end

AUTOMATIC WELDER TRIPLES WIRE BOLSTER PRODUCTION

Wire bolsters, used to support reinforcing rods in concrete construction, are now produced at the rate of 5000 fph on a new automatic welding and forming machine.

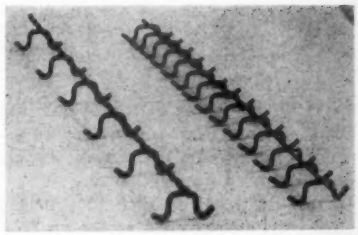
This high-speed machine, Figure 1, was designed and built for a leading steel mill by the Precision Welder and Flexopress Corp. to produce bolsters of two basic types — slab and beam. The top strand of the slab bolster, shown at left in Figure 2, is corrugated on one inch pitch centers while the top strand of the beam bolster is straight. Both types call for formed wire legs to be welded to the top strand on various spacings from 2" to 5". Leg heights vary from ¾" to 3", and both types are produced on this one machine. The new slab production rate of 5000 fph is three times as great as previous rates, while beam production for 5' bolsters is 400/hr as against the former rate of 385/8hr shift. Welding strength and consistency have also been considerably improved.

FIGURE 1.

Operation is as follows: Adjustable feed corrugator wheels pull the top strand wire through a straightener and feed the corrugated wire lengthwise into the welding station. Corrugator wheels are extra wide and can be shifted to provide even wearing. These can be replaced with smooth wheels to feed straight wire for beam bolsters.

A hitch-type feed pulls up to six wires through their own straighteners and feeds them into the welding station at right angles to the top strand wire. Hitch feed is fully adjustable for both length of feed and spacing between wires.

The welding station is composed of six special Precision pincher-type guns, which are readily adjustable for various leg spacings, and are fired from three 50KVA dual-secondary package-type transformers. A shear between the hitch feed and the welding guns is timed to shear legs to length after the guns exert clamping pressure, but prior to weld current flow (to prevent shorting).



After welding, the part is transferred to the leg forming station, consisting of a four-post double-crank press with appropriate dies. An extension of the upper platen carries an alligator type shear, which shears completed bolsters to any desired length. Air-operated run-out chute ejects bolsters onto a bundling table.

All elements of the machine are driven and timed from a main crankshaft which is coupled to a 5-hp motor and flywheel by a heavy duty air clutch and brake.

ELECTRONIC INVENTORY CUTS COSTS AT BELL & HOWELL

Fig. 1. With aid of IBM 650 computer (part of which is shown above), Bell & Howell has cut time required to calculate inventory needs from 2½ months to 2½ weeks. Much of data computer needs to handle the job is stored on "master design cards" (far left). Clerk is shown removing automatically-prepared parts requisitions, one by-product of new system.

A CHRONIC HEADACHE IN JUST ABOUT EVERY material control and/or production control department is the often-complex task of adjusting inventory levels to fluctuating production schedules. Most effective solution is to determine, from the output planned for a given period, the quantities of all raw materials and component parts which the line will require. But this determination must usually be made several months ahead, so that the shop and/or outside suppliers will have ample lead time. All of which may create problems. For example:

Say the upcoming production schedule has to be changed between the date that inventory orders are placed and the date that raw stock or parts are delivered. Often, there won't be time to alter the purchase requisitions and shop orders quickly enough. Result: the assembly line will have difficulty meeting the new schedule.

In a situation like this, the company often ends up with either too much finished goods inventory or not enough. In the former case, investment capital is frozen unnecessarily. In the latter, production is slowed or stopped, encouraging the customer to take his business elsewhere.

With the aid of an IBM 650 computer and several stacks of keypunch cards, Bell & Howell Co. — nationally-known manufacturer of photographic and electronic products — has found a middle road between the twin horns of this inventory dilemma. Basically, what the firm has done is to shorten by several weeks the time required to calculate the parts requirements needed to meet a given production schedule. Formerly, this figuring job took about 2½ months and involved a crew of 37. Now, thanks to the computer and the cards, it takes about 2½ weeks, and a staff of 26. Those displaced have been reassigned. The labor saving in inventory planning alone amounts to more than $50,000 annually, reports Ken Kreissl, Bell & Howell's material control manager.

More important, the constant threats of too much and too little output have been virtually eliminated. For now, if an upcoming producton schedule has to be changed after the inventory orders have gone out, the new requirements can be calculated, sent to the manufacturing departments and/or outside suppliers in time for them to alter their operations accordingly.

Formerly, it took the B&H material control department at least three months to make the revisions in existing shop orders and purchase requisitions necessitated by an increase in the production schedule. If less than three months were available for this job, material control cut into the supplier's existing lead time, and the spectre of a starved assembly line raised its ugly head. Only effective way of erasing this spectre was to carry a substantial inventory reserve at all times, which tied up capital.

Now, material control can reflect an upcoming production increase with as little as 2½ weeks' advance notice. As a result, the company has eradicated much of its inventory cushion, and freed funds in the process.

Between the beginning of 1957, when the present inventory control plan was developed into its present form, and the end of the year, Bell & Howell's total work-in-process inventory was reduced 12%, according to Kreissl. And at the end of the first quarter of 1958, he adds, total work-in-process inventory on hand was 15% less than the previous year's figure. Significantly, all of this reduction occurred during a period when sales were rising. How much capital the company has freed is not disclosable, but, reports Jim Young, planning supervisor in the material control department, "it's a matter of several hundred thousand dollars."

Fig. 2. Planning sheet, which shows production requirements for each piece part, broken down by month, for a year ahead, is turned out on this tabulator, utilizing data supplied by master design cards at left.

Bell & Howell's central manufacturing, slide projector, cases, and electronics divisions are now making full use of the new inventory control system. The others are in the process of being switched over. These first four divisions account for more than 50% of the firm's production of motion picture cameras, slide and motion picture projectors, tape recorders, and microfilm machines. Involved in this effort are 31 product designs and 100 product models. The monthly list of inventory needs covers an estimated 31,000 parts, and requires in excess of 400,000 separate calculations.

The production pipeline, briefly, looks like this: Manufacturing departments within the company, and outside suppliers, receive orders from four to six months ahead of the time that parts actually will be needed in assembly operations. When completed, the parts are delivered to in-process storage. Deliveries are made, typically, no more than three months in advance of actual use on the assembly line. The assembly department draws upon this stock as it's needed to put the finished products together. The latter go into finished goods storage, then are shipped to the customer.

A manual record is now kept of the finished parts inventory (the company is in the process of putting this inventory data on magnetic tape). At the end of the month, the quantity of each part on the shelf is keypunched into a deck of "stock input" cards that are used in the inventory calculation.

A record is also made in the assembly department of all parts requisitioned from in-process storage during the month. This record is kept on an "assembly control unit" card which also shows the number of parts that were already in process or in off-line storage on the first of that month. It is from this combined stock that the assembly department meets its monthly production quota. Thus, by subtracting the quota from the total parts on hand, in process, and requisitioned during the month, material control can determine, at the beginning of the next month, how many parts each assembly activity should have on hand to fill future needs.

The overall inventory calculation is made at the beginning of each month, and covers needs for that month, plus the next 11 (a year altogether). It begins with a production schedule, showing the number of cameras, projectors, and other products the company wants to turn out each month (these figures are based on a forecast prepared by the sales and marketing departments).

In the material control department, there's a stack of keypunch cards (known as a "master design deck") for each product model produced by the company. Each card shows the quantity of a given part needed to make one unit (i. e. one camera, projector, etc.). The computer's first job is to multiply the quantity figures on each master design card by the production quota for each of the 12 months (the latter are set up as constants in the computer's memory unit). The result of this computation is a tabulation, broken down by part number and by month, of the gross parts inventory needed by the assembly department to produce the number of cameras, projectors, and other finished products demanded by the schedule.

Next step is to determine the quantity of parts on hand or in process within the assembly department. The computer does this, as indicated above, by subtracting the previous month's quota from the parts total shown on the corresponding assembly control unit card. The resulting balance represents work still in process, or in off-line storage. Some time during the next 30 days, these parts will be assembled into finished products. Thus, by comparing the assembly department's "on-hand" balance of each part with the production quota (previously converted into parts), material control can determine whether additional supplies have to be requisitioned to meet the schedule. If the on-hand balance is inadequate, the size of the requisition can be determined automatically — merely by subtracting this balance from the production schedule for the corresponding part.

Final step in the basic inventory computation is to subtract the requisition quantity from the stockroom balance (as shown on the

Fig. 3. A manual record is kept of the quantities of parts in stock. At the end of the month, this data is transferred to key-punch cards, as shown above, which provide one of the inputs the computer needs to make the inventory calculation.

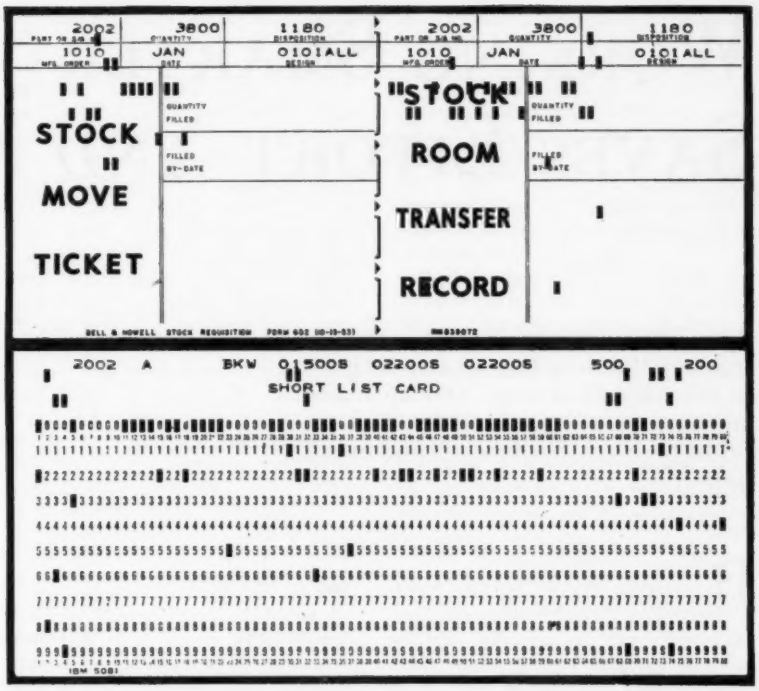


Fig. 4. Pictured above are two by-products of inventory calculation. Upper card (No. 1) is automatically-prepared parts requisition, lower one is "short-list card" which shows quantity of each part that will be needed for assembly operations during each of coming three months. Latter card is used by B&H expediters to make sure that suppliers and manufacturing departments will deliver on time.

stock input card). This operation shows whether there's a sufficient supply of parts on the shelf. Here again, if the supply is inadequate, the amount that has to be obtained from a manufacturing department or an outside supplier can be determined automatically.

Basically, the computer produces three outputs: 1) a set of keypunch cards used to requisition additional parts for assembly operations from the in-process stockroom; 2) another set of keypunch cards ("short cards") showing the kinds and quantities of parts that are out of stock, or getting low. Expediters use these cards to make sure that the orders previously placed for fresh supplies will be delivered in time; 3) a set of planning sheets; these show production schedules, by part and by month, for each of the 12 months involved in the overall calculation.

These planning sheets also show when existing supplies of all parts on the stock room shelf, and on hand or in process in the assembly department, will run out. Thus, material control can issue instructions to the purchasing department concerning piece parts that should be ordered, and as delivery schedules are set up they can be reappraised each month in the light of fluctuating production needs. Material control can do likewise in making up and following through on the shop orders sent to manufacturing departments.

The shop orders are also used by the raw materials supply section to plan their purchases. Basically, the quantities of parts on each order are converted into the pounds of steel, aluminum, plastic, and other materials that must be purchased to fill production needs.

The beauty of this inventory control system is its flexibility. For example, say that sales decides in January that 1,000 cameras of a certain model number will be manufactured in June, and then on May 1, because of changes in the demand picture, ups the figure to 2,000. By May 5, the computer has processed the master design decks and revealed what additional quantities of each part are needed to accomodate the increase. Also, by this date, material control knows how many more parts will have to be delivered to assembly from the stockroom, and whether these latter stocks are sufficient. If they aren't, the proper manufacturing departments and/or outside suppliers can be alerted to increase the size of an upcoming order, or move up a delivery date that originally was scheduled, say, for July 1, to June 1.

The change in the June production quota, of course, is going to affect the inventory needs for the following several months. Through use of the planning sheets, material control and purchasing can keep on top of this situation, moving delivery dates around, and altering order quantities to conform with the assembly line's new needs. The result: even though production schedules can't be firmed up several months ahead of time, Bell & Howell is still able to maintain its inventory with only a modest reserve — saving storage space and capital investment.

The mechanical preparation of parts requisitions represents one of several auxiliary benefits produced by the new system. Formerly, one fulltime clerk was needed to prepare these chits. She has since been reassigned.

There has been a further personnel saving in the stock records department and stockroom, because of the reduction in requisitions made possible by the new inventory control system.

When the computer compares the quantitites of parts on hand in the assembly department against the production schedule, it checks the schedule figure for each of the three months. In other words, if the inventory calculation is being made as of Jan. 1, the onhand balance at that time is subtracted from the January, February, and March quotas. The shortage (i.e. requisition quantity), if any, for January and February is shown on the requisition card that is cranked out by the computer afterward. On less-expensive parts, the March shortage is also printed out.

If the on-hand balance is adequate to take care of January and February needs, the computer will analyze the schedule for April, and perhaps May. Result: every requisition that goes to the stockroom covers at least two months' needs, and sometimes (in the case of inexpensive parts) three.

This consolidation has enabled B&H to cut the stock records and stockroom personnel needed to process assembly department part requisitions by 25%. Adding in the labor saving produced by the switch from manual to mechanical preparation, Material Control Manager Kreissl estimates that the cost of handling requisitions has been cut approximately $10,000 a year.

end

WORKING SMARTER SAVES EFFORT *AND* MONEY

by Walter D. Smith
Work Simplification Department
UNION STEEL PRODUCTS COMPANY
Albion, Michigan

Basing its program on the premise that a dollar in savings equals the profit from $20.00 of sales, USP sponsors and encourages Work Simplification projects to save both money and manpower.

BUSINESS SLOW—SALES OFF — PROFITS DOWN? Recession taking its toll in lay-offs, smaller pay-checks, and higher costs? This was the situation facing the Union Steel Products Company last spring when it attacked the higher cost part of the problem with a powerful Work-Simplification campaign.

In the April 1958 issue of the company publication, employees were confronted with this story:

"LET'S BLOW THE LID OFF"

"Perhaps you have noticed these signs around the plant. Here's what it's all about.

"One dollar of savings is equal to approximately $20.00 of sales. That is, it requires a sale of $20.00 to make $1.00 profit.

"There have been 173 men who have helped develop the Union Steel Work Simplification Program. If each 'graduate' turned in just one proposal for approximately $100.00, it would mean a savings of $17,300.00. To make the same amount of profit by sales would mean we would have to sell some $346,000.00 worth of new business or almost a month's business for one division.

"Will you help? Here is your opportunity to do something concrete about the current slump in business — just one proposal from each graduate, or anyone else who would like to participate in Operation Lid's Off.

"A record will be kept for each division and placed in the shop to show you how your division is doing. A pocket protector with the word 'WHY' on it will be given to each person turning in an acceptable proposal.

"This program will run for two months and those people you see wearing the big 'WHY' on their pockets will be those who have turned in a proposal to blow the lid off the current slump."

In the next two months, 27 cost reducing proposals were received by the Work Simplification Department. Of these, 22 were accepted, followed through, and put into effect. A yearly saving of $12,116.00 was realized — or, using the formula of one dollar profit to twenty dollars of sales, the same amount as would be shown from a sales volume of $242,320.00.

This is the latest result of the effectiveness of Work Simplification which has become a way of life at Union Steel.

Work Simplification was first introduced to Union Steel personnel in 1949 when a booklet or canned type of program was offered to the foremen and supervisors. This training was not followed up and soon withered on the vine.

In 1954 the program was revived and with the full support of top management, developed by 1956 into a full-time program. The Work Simplification Department consists of a full-time Work Simplification Coordinator; two part-time assist-

SOME SMART IDEAS THAT HAVE PAID OFF

1 — A 60-lb welding fixture used to fabricate a wire basket was difficult to load, awkward to handle, and constantly in need of adjustment and/or repair. Combining skills in drafting, in fixture building, and in setup, a W-S project team devised three small fixtures which are fastened directly to the coppers of the welding machines. The operation is now twice as fast and less fatiguing. Increased production with less effort cut costs, making prices more attractive to the customer, and resulting in an increase in the volume of work in the plant.

2 — A foreman in the packaging and shipping department noted that parts were being cleaned and then stored until needed for shipment. By this time, they usually needed a second cleaning. He suggested that after the initial cleaning, all the parts for each assembly be placed in stenciled cartons and then stored. Making shipments from these previously packaged units saves more than $2,100.00 per year.

3 — The sharpening of trimmer blades was a slow, tedious process. The blades were held in a vise and set to the proper angle for grinding with an indicator. Three tool makers and the assistant foreman of their department constructed a grinding fixture which holds the trimmer blade in any of

ants; a fully-equipped classroom, complete with motion picture camera, projector and screen, flannel boards, flip charts, black board, functionally shaped conference table, training materials storage cupboards, and an operative "traffic light" to dramatize "stop-and-go" thinking.

Fifteen men were selected from various departments for the first W-S classes. This pilot group represented all phases of the operation: sales, finance, production, design, personnel, engineering, maintenance, scheduling, and general office. As the group was trained, they analyzed and evaluated the material used until a course of Work Simplification training especially adopted for Union Steel was evolved.

After the pilot group was trained, 39 more higher management people were quickly put through the course to check the training pattern. Other groups followed at frequent intervals. Now over 25% of the work force are W-S graduates.

People are trained in classes of 12 to 15. The two-hour classes are conducted once a week for 10 weeks. Usually there are three units in training at the same time.

During the training period, each member of each group takes a turn at presenting some phase of the training material. Personal assistance in the preparation of the presentation is rendered by the Work Simplification Coordinator or his assistants. Printed material is taken from the department's files and from this, or from his own personal experiences, the trainee works up his part of the training of the Work Simplication technique or philosophy and presents it to the class. This stimulates individual and group interest, brings the group together into a well functioning team, and serves to overcome any timidity a person might have toward team participation. Here is one example of how Work Simplification training at Union Steel differs from most other W-S courses.

The first training sessions are devoted to Work Simplification philosophy. How competition compels us to seek ways to simplify jobs is brought out. The connection between job security and lower operating costs is stressed. The trainee becomes familiar with the flow process chart.

Later sessions deal with Work Simplification methods such as selecting a job to improve, analyzing it, and solving the problem. This Five Step Pattern of Work Simplification is used:

1. Select a job to improve.
2. Get the facts — make a flow process chart.
3. Challenge every detail — list the possibilities.
4. Develop better methods — eliminate, combine, change, improve.
5. Install the improvements.

Final sessions deal with tools of Work Simplification, such as multiple activity and operator charts.

About midway through the training course, the class is divided into three-man project teams that select jobs to improve. They analyze the facts of the operation, make their flow process charts, and bring their problems to class with them. This procedure has been extremely successful. Many improvements have been installed with the accompanying savings in dollars and cents being realized before the trainee has completed the Work Simplification training.

A W-S course graduation program, a monthly "Work Simplification News," an "Honor Roll," and posters are but a few of the frills that build up and maintain enthusiasm for W-S practices.

No cash awards are made for W-S ideas accepted at USP, so such ways to contribute toward personal recognition are important. The decision not to get involved in a paid suggestion system was made by the pilot group, and subsequent groups have never seen fit to alter this decision.

Each division of the company has formed its own cost reduction teams. These are composed of graduates of the Work Simplification Training Program who meet regularly to discuss and improve work methods in their own divisions. Score is kept of the savings instituted in each division, which leads to real competition to see who can set the best record in money saved by better methods.

This same procedure was followed in Operation Lid's Off.

Each division was represented graphically on posters. The goals in number of proposals and dollar savings were apportioned between the divisions according to the number of W-S graduates from each. The posters were placed in strategic locations throughout the shop at the same time that the announcement was made in the "Work Simplification News."

Proposals started coming in almost immediately. Over twelve hundred dollars per year was realized from one of the very first projects installed. This proposal incidentally, came from a three-man team which had not finished the complete course of training.

Operation Lid's Off's final figures — a yearly saving of $12,116.00 — is a good illustration of how "working smarter" can mean money in the bank, particularly when business is slow, sales are off, and profits are down. end

---

four required positions. An annual savings of $1,200.00 is the result of this improvement.

#4 — Cut wire formerly was stored and transported in wheeled tub-type containers. Production operators spent 10% to 15% of their time loading supply racks from these supply tubs. By constructing special portable open-end wire mesh pallet containers that can be handled by fork lift truck and placed directly on pipe stands at the production machine, practically all loading on the part of the production operator has been eliminated. Savings on this proposal are running better than $4,630.00 a year.

#5 — Wire webs for Palletainers, materials handling containers manufactured by Union Steel, are welded in an assembly line arrangement. Webs rejected because of weak welds were taken out of the line and repaired on any welder available at the time. Later these same webs came back into the line with resultant confusion and extra material handling. Production was curtailed and time and money wasted. A proposal was turned in to establish a central repair station with proper tools and a trained operator. Repair webs are picked up at regular intervals, re-welded, and returned to the line quickly with no disruption of the normal flow of materials. This idea saves $9,600.00 per year. end

AUTOMATIC EQUIPMENT CUTS FINISHING COSTS AT BORG-ERICKSON

BORG-ERICKSON CORP., CHICAGO BATHROOM SCALE MANUFACTURER, has cut finishing costs substantially, and improved product quality as well, by installing an alkali-bath tank that strips accumulated paint off conveyor hangars automatically. Further economies have been obtained by a dryoff oven that operates on reused heat.

The stripping tank and dryoff oven are part of an 875′ conveyorized finishing line which processes metal platforms and bases for B-E's line of bathroom scales. Previously hangars were taken off the conveyor manually, and put in a wire basket which was lowered into a caustic bath. After completion of the stripping operation, the cleaned hangars were put back into service on the conveyor.

Two workers were required for this hangar-stripping operation. The present stripping tank, by comparison, operates automatically. The resultant labor saving comes to approximately $7,200 a year, reports Bernard Ullmer, B-E's factory superintendent.

Each conveyor hangar is now cleaned of accumulated paint in approximately five minutes. Formerly, the hangars had to be soaked in the caustic-filled batch tank overnight.

B-E's finishing operation begins at a three-stage washer. Afterward, parts move through the dryoff oven, a Ransburg electrostatic spray booth, a 32′ flashoff tunnel, and then into an elevated baking oven. Next step is inspection. Scale platforms and bases are then unloaded, dried for 24 hrs and assembled.

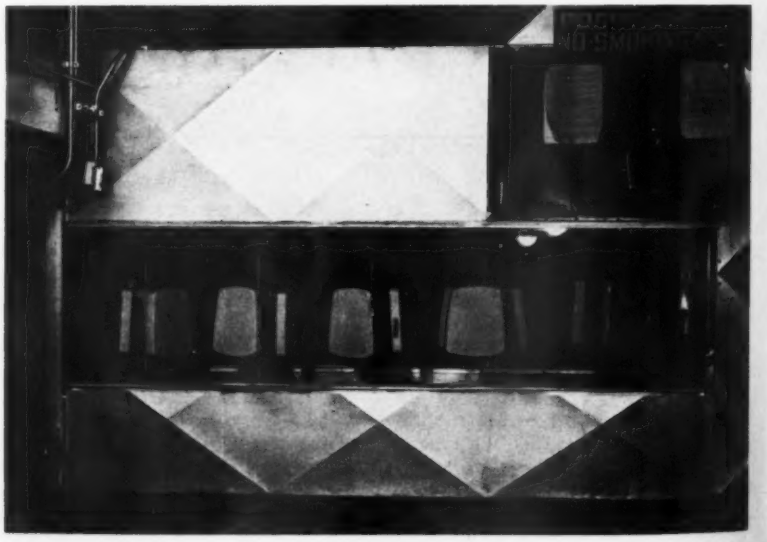
Fig. 2. This window permits B-E's finishing department supervisor to check work quickly and easily as parts leave dryoff oven and move into baking oven (part of which is shown at left).

Fig. 1. Stripping tank, filled with alkali-type solution, removes paint from conveyor hangars and rejected parts automatically. Hangar-stripping, which formerly required several hours, is now completed in five minutes. Quality of job is improved also.

Two novel design features in the dryoff oven have reduced B-E's operating costs appreciably. One cost cutter is a duct that permits heat generated originally in the washer to be reused in the oven.

Enough exhaust heat is available to maintain a temperature of approximately 200°F in the oven, which is adequate for the dryoff operation. Hot air is drawn through vents in the roof of each washer chamber and into a 12″ dia duct by a 2,500 cfm blower. The blower discharges through openings in the wall of the dryoff oven, which consists essentially of three tunnels, each 12′ long. Parts pass the blower openings while moving from the first tunnel to the second.

Within certain temperature limits, the amount of heat needed to dry a given part in a given amount of time can be reduced if the volume and velocity of air passing across the surface is increased. In other words, by increasing air turbulence, operating temperature of the oven can be reduced, with a



CINCINNATI keeps these tough grinding jobs under control

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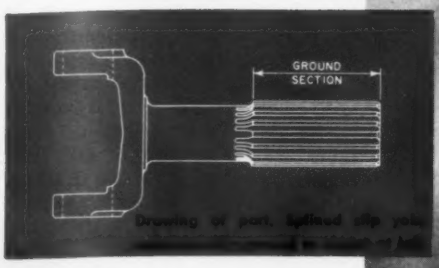

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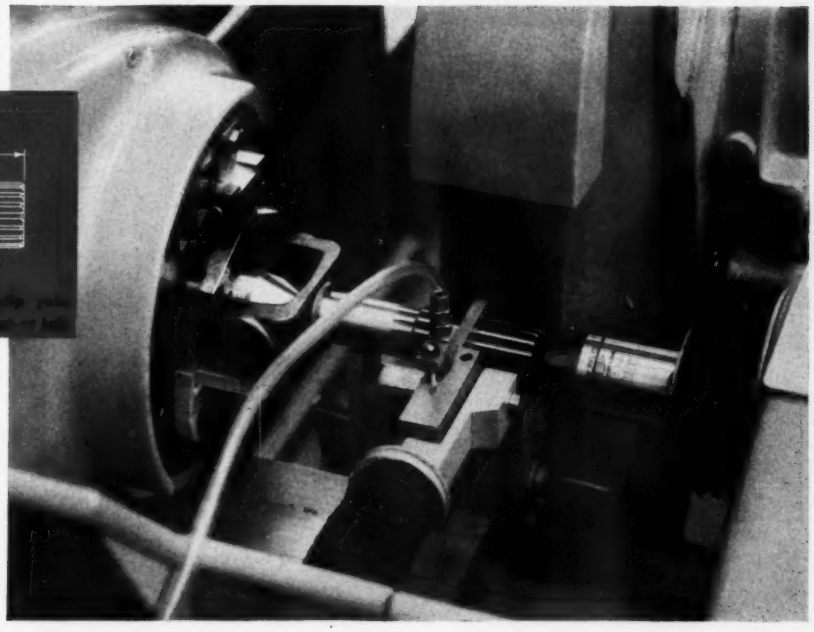

Horizontally mounted Air-Electric Gage Sizing Equipment, on CINCINNATI FILMATIC 10"R Plain Grinder, keeps size and production under control. Operation performed—grinding spline section of automotive splined slip yoke.

Cycle Time Stabilizer automatically compensates for wheel wear

Spline sections and other cutaway diameters are tough on grinding wheels. Ordinarily, frequent adjustments for size and/or length of infeed cycle are required. Cincinnati cures these ills of rapid wheel wear with Automatic Air-Electric Gage Sizing. An exclusive extra advantage of this equipment, Cycle Time Stabilizer, does the trick. It automatically adjusts the length of infeed cycle to compensate for wheel wear and truing. Cycle time cannot increase; rate of production cannot decrease. ¶A horizontally mounted variation of Automatic Air-Electric Gage Sizing is incorporated in the CINCINNATI FILMATIC 10"R Plain Grinder abbreviated in the illustration above. Other automatic features which help to keep the cost of production at a minimum include:

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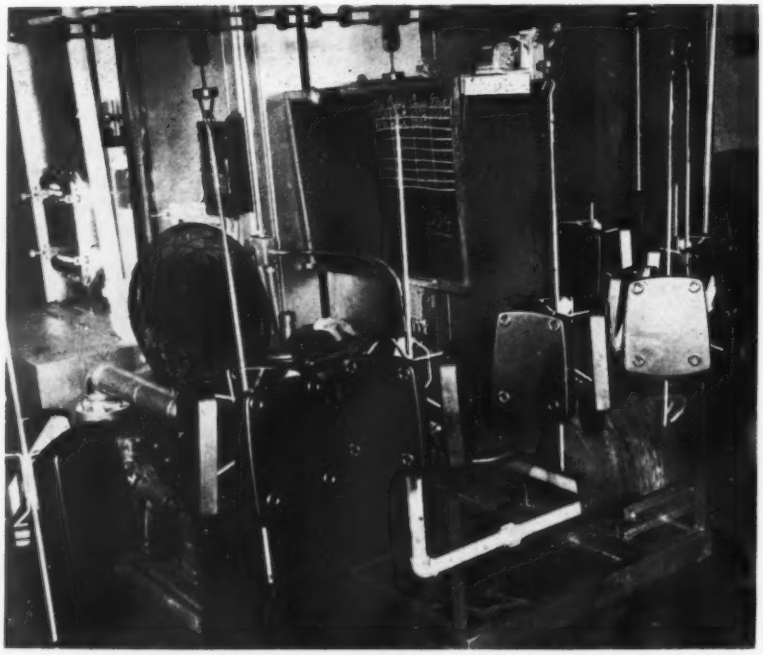

Fig. 3. Picture above shows loaded conveyor entering three-stage washer, first step in finishing sequence. Blackboard lists quantity and type (base of platform) of part being processed.

resultant saving of fuel expense.

Borg-Erickson took advantage of this fact by using a second blower with the dryoff oven, rated at 5,000 cfm. This blower recirculates oven air — drawing it out of the first tunnel and sending it into the third one.

Through this combination of exhaust heat and recirculated air, B-E is able to dry each part completely after a three-minute conveyorized trip through the dryoff oven.

Without the second blower, Supt. Ullmer estimates that a minimum operating temperature of well over 250°F would be required in the dryoff tunnels. Cost of the fuel needed to supply this heat separately would come to approximately $800 annually.

Before entering the dryoff oven, scale components spend seven minutes in the three-stage washer, which performs the first step in the finishing sequence. The washer is 58′ long. In the first stage, parts are sprayed with an inhibited phosphate solution which removes shop soils and oil in addition to depositing a phosphate coating that inhibits rust and helps to improve paint adhesion later on.

Second stage consists of a clear-water rinse; third involves running the parts through a chromic acid spray that neutralizes the surface and provides a slight etch that further improves the component's ability to hold paint later on.

In all three stages, the solutions are maintained at temperatures ranging from 160° to 180°F. The spray is applied through V-jet nozzles installed along the top, bottom, and sides of the washer housing. The conveyor moves parts at right angles to the spray curtain formed by the discharge from the nozzles.

Heat is supplied by the premix-type gas burners firing into large-diameter tubes built inside the tanks that store the solutions. A 1,000 gal capacity tank stores the first stage phosphate solution, while 500 gal storage tanks are used for each of the other stages.

After being washed, dried off, and coated in the Ransburg electrostatic spray booth, parts spend four minutes in a flashoff tunnel, where volatiles are evaporated. A rather novel feature of this tunnel is an 8′ long x 3′ high glass window built into the side facing the finishing room floor. The window permits the supervisor to check platforms and bases visually as the work is carried along by the conveyor.

From the tunnel, the conveyor rises approximately 7′ to the bake oven. By elevating the oven, B-E was able to obtain two advantages:

First, there is a saving in floor space. Approximately 50% of the flashoff tunnel is located directly beneath the oven. If the latter facility were put on the floor, approximately 700 sq ft of floor storage area would be lost, according to B-E officials.

The second advantage of an elevated oven is that it permits entry of the conveyor through the bottom of the baking chamber. Since the heated air inside is constantly rising, there is a natural heat seal across the opening, and the heat losses are appreciably less than if the conveyor were to enter through the side or top of the chamber.

Parts spend approximately 14 min in the oven. They travel the length of the baking chamber seven times, a total distance of 210′. Heat is supplied by a 750,000 BTU-capacity gas-fired heater. Operating temperature is 300°F. A thermostatic control system, operating relay-actuated adjustable oven dampers, prevents the temperature from varying more than three degrees from this figure.

Perhaps the most novel feature of Borg-Erickson's finishing line is the automatic stripping tank. Besides eliminating the need for the two men who formerly operated the batch stripping tank, the new setup has a number of additional advantages.

First, the stripping operation is more efficient. Before, even after they were soaked overnight, up to 70% of the conveyor hangars had to be re-immersed in the caustic bath because not all the paint had been removed. Now, the same hangar spends only five min in the solution, without having to be removed from the conveyor, and the treatment is 75% efficient.

Complete removal of paint on hangars is essential when a Ransburg-type spray booth is used. The hangar acts as the positive electrode, attracting the negatively-charged paint particles issuing from the gun. If the holder is covered with paint, its electrical charge, in effect, is diminished, and the paint is dispersed and wasted.

Hangars are now stripped of accumulated paint after each run through the finishing operation. The stripping tank is located on the return loop of the conveyor, between the point in the assembly department where enameled and baked case parts are unloaded, and the point in the punch press department where fabricated parts are loaded preparatory to being finished.

Previously, hangars were stripped every week. By doing the job more frequently, the maximum paint accumulation on each hangar has been reduced appreciably. As a result, the number of parts leaving the booth inadequately coated

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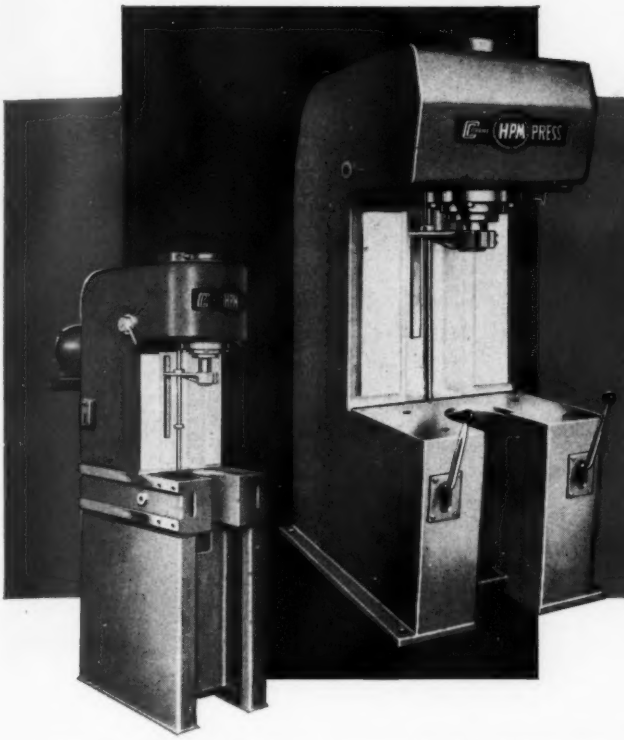

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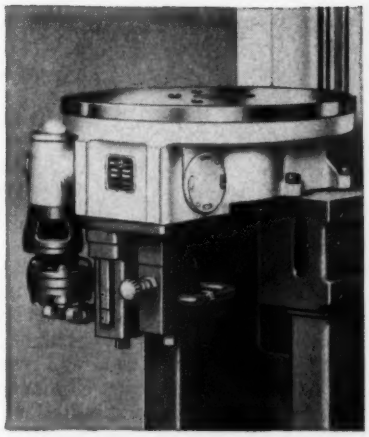

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— formerly as much as 10% of all those spray-painted — is now about 1½% of the total.

A major reason hangars require so little time in the stripping tank is that they are made from nickel-plated, low-carbon steel. The fixtures previously used were unplated. The layer of nickel, approximately 0.0005" thick, provides a harder, less-porous surface, and thus paint doesn't stick to the hangar as firmly, Mr. Ullmer explains.

The stripping tank holds 3,000 gal of an alkali-type solution which is kept at a constant temperature of 200-210°F. The tank measures 32' long and 6' wide. The conveyor makes two passes through the bath, traveling a total distance of 64', at a speed of 12 fpm. Three hangars are attached to each guide pole, and poles are spaced on 18" centers along the conveyor chain. Thus, the tank turns out stripped hangars at the rate of 24/min.

Thanks to this and the other novel features of Borg-Ericson's finishing line, the installation has repaid its entire capital cost — in terms of lower reject rate, fuel savings, and reduced labor cost — every year it has been in operation. end

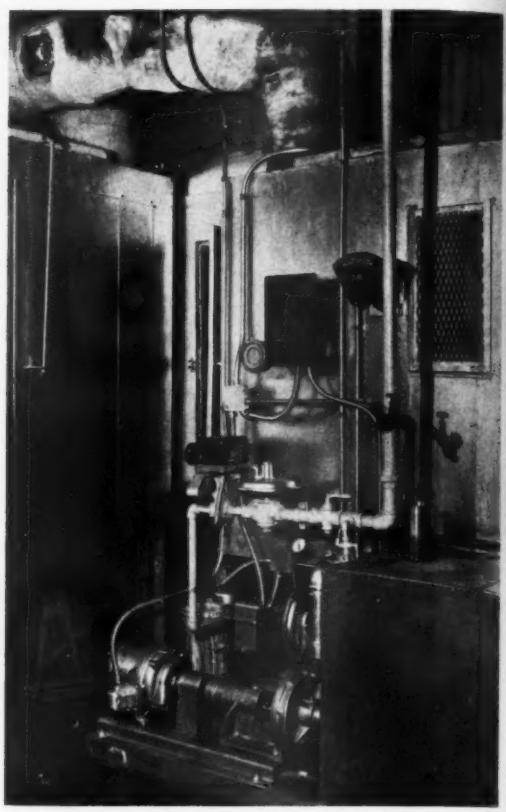

Fig. 4. Duct at top of photo carries heat from washer to dryoff oven. Reuse of this heat cut fuel bill appreciably. Storage tank at lower right is one of three used to hold washer solutions. Each tank has sloped bottom, permanent flush-water system, which expedite cleaning operations.

CHEMICAL MILLING OF MAGNESIUM THORIUM ALLOYS

A recent development in the state of the chemical milling art for the Mag-Thorium family of magnesium in sheet, extruded, and cast forms reduces tool costs, eliminates health hazards, and simplifies machining processes in the fabrication of aircraft and missile components from these middle range, high temperature resistant, and mildly radioactive metals.

Intensive research and development by United States Chemical Milling Corp. has established methods now being applied successfully to regular production runs. These metals have become important because they span the gap in the "strength - temperature" range between the conventional aluminum and magnesium alloys and the heavier steel and titanium alloys. Critical strength temperatures for conventional aluminum and magnesium alloys are in the range of 300° to 350° F, while those of Mag-Thorium alloys are in the range of 350° to 500° F.

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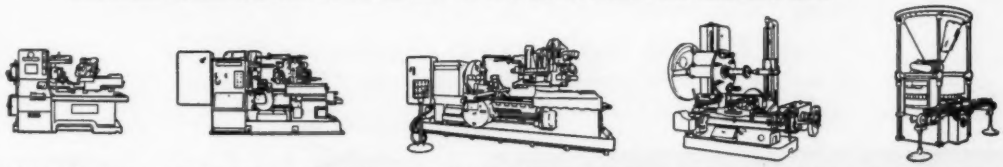

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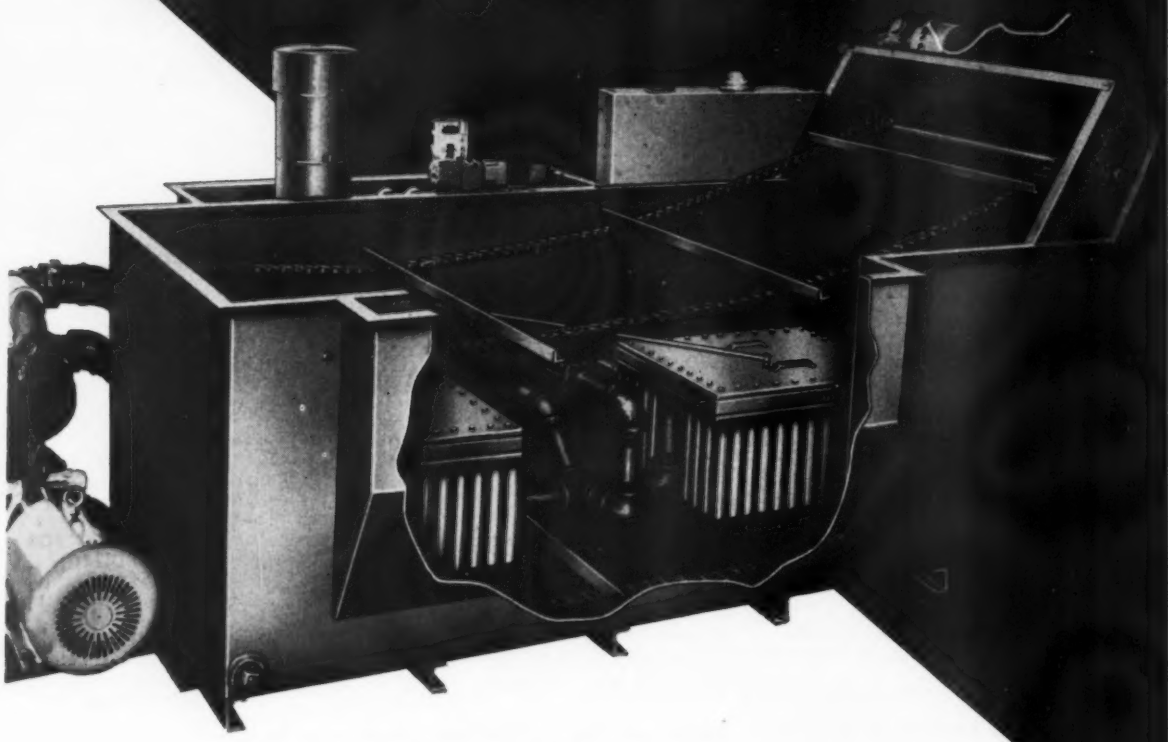

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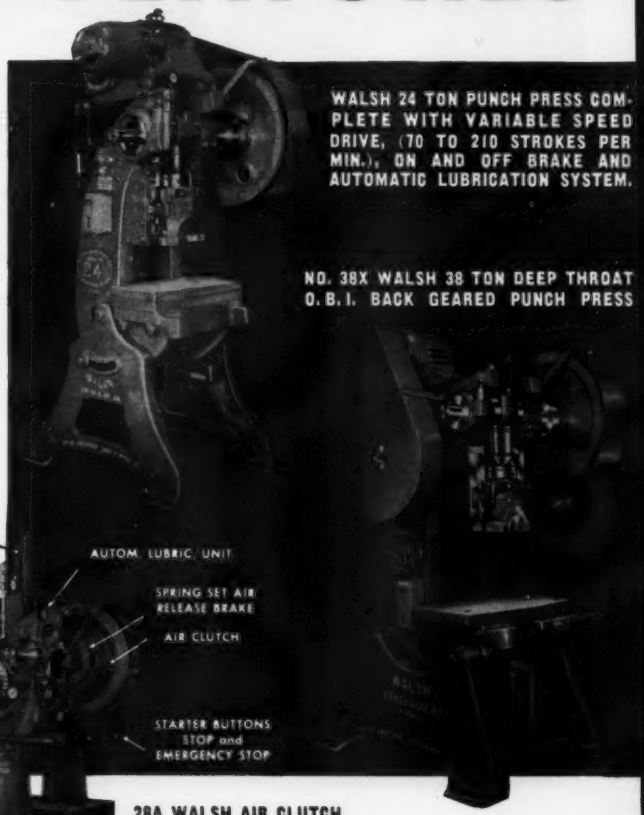

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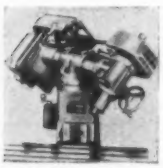
WE MANUFACTURE A COMPLETE LINE OF POWER PRESSES

CIRCLE INFORM-A-GRAM KEY NO. 81

HERE'S PROOF OF PERFORMANCE...

"The Clausing Vertical Miller is the best machine for the money on the market today! It is most versatile . . . and extremely accurate". —F. L. BALLENTINE, EMPIRE TOOL ENGINEERING COMPANY, INC.

The high precision spindle and drive have 7 ball bearings . . . hardened spindle. Ground and hard chrome plated quill has full length bearing in head.



The spindle head can be swiveled in a vertical plane and set at any angle, and turret rotated in a horizontal plane making it possible to machine at all angles with one set-up.

This report is typical of the experience of users everywhere. The CLAUSING VERTICAL MILLER is a precision machine tool designed for operations where "extremely accurate" machining is required. And, it is an outstanding producer, "most versatile, easiest to set up, get around and operate of *any* miller at or near its low price." Only $850 f.o.b. factory.

VERIFIED ACCURACY— Before it leaves the factory each CLAUSING Mill must pass rigid tolerance tests such as:

1. Top of table perpendicular to column ways within .0005" in 6" travel.
2. T-slots square with cross slide dovetails within .0005".
3. Table, parallel to turret within .001".
4. Spindle square with table, front to rear, within .001" T.I.R. in 5" circle.
5. Spindle taper (internal) run out within .0002" at spindle nose.
6. Table T-slots parallel to table dovetail ways within .0005" in 8" longitudinal travel.

MILLS, DRILLS, BORES, REAMS, SHAPES AT ALL ANGLES . . . WITH ONE WORK SET-UP!

Write for Free Literature

CLAUSING DIVISION · ATLAS PRESS COMPANY

10-115 N. PITCHER ST., KALAMAZOO, MICHIGAN

CIRCLE INFORM-A-GRAM KEY NO. 82

AUTOMATIC ASSEMBLY OF SPLIT BUSHINGS IN TRACTOR HOUSINGS

A new automation machine that incorporates a specially designed double-acting tool slide arrangement, press-inserts split bushings in holes in two shaft support bosses of a tractor center housing and burnishes the ID of each bushing, in one operation. Accurate bushing alignment in the support bosses is assured. Production rate is 62 housings/hr at 80% efficiency.

Tractor center housings are manually loaded on guide rails in the center of the machine. The housings are then accurately located and automatically clamped into position. Split bushings are manually loaded on opposed burnishing tools, and when the operator pushes a cycle button, the automatic operation begins.

During the automatic operation, one hydraulically-operated slide carrying a hydraulically-powered burnishing tool advances and press assembles a split bushing into one of the shaft support bosses. After this operation has been completed, the slide holds the bushing in place and the burnishing tool then retracts through the bushing to finish-size the bushing. After the burnishing operation is completed, the slide and the burnishing tool return to the starting position.

After a bushing has been inserted and burnished in one support boss, another double acting bushing assembly and burnishing tool located on the opposite side of the part, press assembles and burnishes a bushing into the second shaft support boss of the housing in the same manner.

After split bushings have been inserted and burnished in each of the two shaft support bosses, the housing is automatically unclamped and manually removed from the machine. This machine was designed and built by Expert Automation Machine Co.

1½" Wide—
3-Pitch Claw Tooth Blade 10' Long.

DoALL SAW BLADE gives you the most sawing for your dollar

Think of it! Here's a precision cutting tool, costing only $2.58, that is capable of cutting 13,000 sq. in. of aluminum. In a typical cost study, No. 355 cast aluminum was cut at 25 sq. in. per minute. Tool cost, based on the actual life of the blade, was only 1/50th of a cent per sq. in.

This gives you some idea of what is happening in metalworking with the new speeds and low tool costs made possible with modern DoALL band machining.

Where else can you get this much cutting for so little tool cost?—And the faster cutting rates reduce direct labor costs, too! The table below gives you typical examples of DoALL Saw Blade performance.

HERE'S THE PROOF!

Cost/sq. in.	Material	Sq. in cut/min..	Standard Blade
1/13¢	No. 316 Stainless Steel ¼" Thick	5	¾"—10 Pitch Friction Saw Blade
7/100¢	24 ST Aluminum	140	½"—3 Pitch Buttress ®
1/5¢	Structural Steel	37	1"—10 Pitch Friction Saw Blade
4/10¢	"Kates" Tool Steel	1.25	½"—6 Pitch Claw Tooth ®
1/50¢	No. 355 Cast Aluminum	25	½"—3 Pitch Claw Tooth

Lower costs ahead for you

Forward-looking manufacturers are taking advantage of the new economies available through DoALL's advanced techniques. Without obligation, a DoALL specialist will gladly discuss your specific applications and advise you where new methods can be applied to save you money. Call your local DoALL store today.

Zephyr machine trimming high chrome-nickel castings. Tool cost 94¢ per 100 cuts.

Model 16-3 Contour-matic sawing aluminum segments. Tool cost 3¢ per 100 pieces.

Model 26-3 Contour-matic slotting bronze castings. Tool cost 46¢ per 100 pieces.

36-W Zephyr

16-M Contour

16-3 Contour-matic ®

SB-63

THIS IS A TYPICAL DoALL STORE

The DoALL Company, Des Plaines, Illinois

CIRCLE INFORM-A-GRAM KEY NO. 83

TECHNITE® POWER HACK SAW BLADES

stay hard, sharp and accurate

cut

after cut

after cut

See Your Capewell Distributor

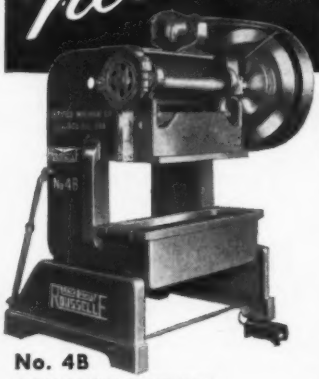
CAPEWELL

THE CAPEWELL MFG. CO.

HARTFORD 2, CONN.

CIRCLE INFORM-A-GRAM KEY NO. 841

New 40-TON DOUBLE CRANK O. B. I. ROUSSELLE



No. 4B ROUSSELLE PRESS

WITH NEW ELECTRICALLY CONTROLLED AIR CLUTCH

- "Plug-in" foot and hand controls.
- Single stroke, continuous and jog selector.
- Low air consumption.
- Large die area.
- Roller bearing flywheel.
- Bronze main and crank bearings.

CHOICE OF 30 SIZES AND TYPES IN 5 TO 40-TON PRESSES

SERVICE MACHINE CO.

Mfrs. of Rousselle Presses

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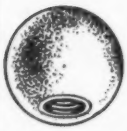
ROUSSELLE PRESSES ARE SOLD EXCLUSIVELY THROUGH LEADING MACHINERY DEALERS

CIRCLE INFORM-A-GRAM KEY NO. 842

REID TOOL ROOM *Accessories*

BALL HANDLES — Threaded

ROUND PLASTIC | OB OVAL PLASTIC | OA OVAL PLASTIC | MUSHROOM PLASTIC



ROUND STEEL

Designed for machine tools, jigs, fixtures, shift lever handles etc. and give your product that "dressed-up" appearance. Made in a wide variety of diameters and thread sizes. Round and oval plastic available in red and black. Steel ball handles are turned from bar stock. Highly polished. Low prices and the finest quality.

Also clamping handles, C.I. Hand knobs, Mall. mach. handles, compression springs, hand wheels and many other accessories and components at low prices.

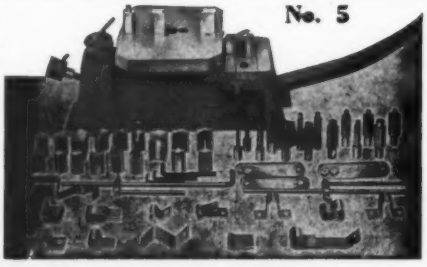
Quality at Moderate Prices!

FREE 78 Page Catalog

REID TOOL SUPPLY CO. Muskegon Heights, Mich.

CIRCLE INFORM-A-GRAM KEY NO. 843

No. 5



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J. A. RICHARDS COMPANY

Multiform

BENDER-CUTTER

CUTS, BENDS, PUNCHES

Available in hand, air or hydraulic models. The MULTIFORM is shipped complete with full assortment of dies and mandrels to form and cut round or flat stock up to 1/8" x 1½" as illustrated. Punching dies available. Other models up to ½" x 8" hydraulic operated. Ideal for steel rule die forming.

ALSO AIR OPERATED MODELS

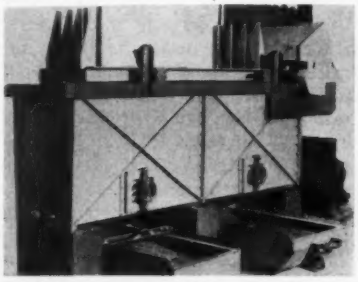
KALAMAZOO, MICH.

CIRCLE INFORM-A-GRAM KEY NO. 844

BARREL FINISHING OF LARGE AIRPLANE SPAR-BOOMS

Mechanical barrel finishing of airplane parts is an established practice in the aircraft industry today. As the parts to be polished increase in size, however, an upper limit is reached where it becomes uneconomical or inefficient to finish by this method. Spars and other units of high fineness - ratio fall within this category and, consequently, a new type machine is necessary if parts of this type are to be finished automatically.

Such a machine has been designed and built by Roto-Finish Co. It is identified and referred to by the name, "Roto-Ram." Its basic principle of operation is to allow the chip-mass to remain stationary. The part to be finished is buried within the chip-mass and relative motion between the two is achieved by applying a reciprocating action to the part.



The "Roto-Ram" machine tank is 8' long x 2' wide. Frame carrying the workpiece is moved backwards and forwards by action of hydraulic ram.

The design of the machine consists of a rectangular space framework constructed from steel joists. The workpiece carriage unit is suspended from the top of the framework and will handle two spar-booms approximately 5' long, weighing 50-52 lbs., held in a horizontal plane beneath it. Four pneumatic jacks supply the power to move the carriage.

The hydraulic ram is connected to one end of the frame and the amplitude of the stroke, which is controlled by spring-loaded cams that trip a pneumatic sequence valve, can be varied from 0" to 10".

In the lower parts of the frame rests the tank containing the abrasive medium. The tank is supported on trunnions so it can be tilted to facilitate chip unloading.

The operation of the machine starts with the tank in the "down" position. Power is switched to the recriprocating jacks. The frequency with which the carriage is operated is 60 cyc/min. While the work-carriage is being reciprocated, the tank slowly raises until the spar-booms begin to slice through the surface of the chip-mass. They are completely buried when the tank is elevated to the "up" position. When fully raised, the tank is locked in position mechanically.

As with all surface-finishing sequences, certain surfaces require more work than others because of part geometry, and it is necessary to change the position of the part within the chip-mass. Provision is made for doing this and for rotating the two spars and their adjacent holding plates through 180°.

Before surface-finishing, the average roughness is 150 micro-inches center-line average. After finishing, this value is reduced to 30 micro-inches. The basic requirements for these spar-booms are not to achieve a highly-polished surface but to eradicate surface marks that can create high local stress-levels, and to produce a uniform radius on all edges. The surface produced has a matte satin appearance.

Again **PUTNAM LEADS . . .**

Standard End Mills . . . For the first time you can select from a complete line of **standard** end mills designed specifically for milling aluminum . . . Putnam stocks 185 **standard** types and sizes.

New Designs . . . These **standard** end mills have been developed through years of research and experience on aluminum applications. Over two years ago, Putnam introduced the first **standard** end mills designed for milling of aluminum. Today, no other manufacturer offers as complete a line of **standard** end mills for aluminum.

For further information on Putnam End Mills for Aluminum, write for Catalog 457.

Contact your Putnam Distributor for personalized service, quick delivery of the finest standard end mills for aluminum.

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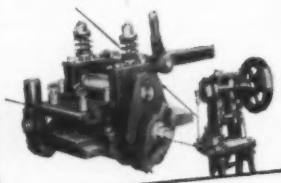
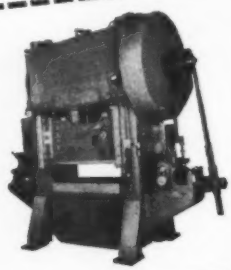
CIRCLE INFORM-A-GRAM KEY NO. 85

LITTELL ROLL FEEDS



LITTELL STYLE M FEEDS
6 sizes for single automatic feeding to standard presses. Feed stock up to .055" x 8", left to right or right to left. Feed length ranges, 0-2" through 0-4⅜" with plain gears and 0-4½" through 0-8½" with compound gears. Built for years of high speed, low cost automation feeding.



LITTELL STANDARD RACK AND PINION FEEDS
No. 6-12½ Littell Double Rack and Pinion Roll Feed mounted on brackets on right and left side of Straight Sided Press. Equipped with eccentric roll lifters. Littell Feeds to fit OBI presses are also available. Accessories such as oilers, straighteners and scrap cutters supplied at additional cost. Get catalog information.

AUTOMATE

YOUR PRESENT PRESSES FOR UP TO 5 TIMES MORE OUTPUT

Want more output from your present presses? Equipped with Littell Roll Feeds those presses will punch out two to five times more stampings per hour. These Littell Feeds are pre-engineered to fit standard OBI or Straight Sided Presses and they come ready to install. Delivery is fast, installation simple. Your investment comes back in a hurry through the increased output, lower stamping costs, operator safety and lower insurance rates.

GOOD DELIVERY

Enlarged plant, new equipment to speed delivery.

SEE OUR CATALOG IN SWEET'S

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to get full facts on Littell Feeds.

F. J. LITTELL MACHINE CO.
4197 N. Ravenswood Ave.
Chicago 13, Illinois
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F.J. Littell Machine Co., 4197 Ravenswood, Chicago 13, Ill.
Send Catalog Sections "A" Describing Littell Roll Feeds.

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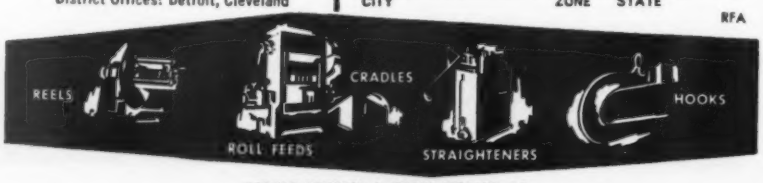


CIRCLE INFORM-A-GRAM KEY NO. 86

INTRICATE GRINDING TEMPERATURE CONTROL

When you are making parts for measuring instruments that must accurately measure 0.000001", you have an acute temperature control problem at the grinding contact of those parts.

This was the problem which once faced The Moore Special Tool Co., manufacturer of highly-specialized precision jig borers, grinders, and measuring devices that need accurate lead screws. The company's Master Mechanic Bruno Rubinsky developed a revolutionary approach to the meticulous lead screw grinding problem, however. He found that an air conditioned and dehumidified grinding room was not the answer. The grinding process itself caused temperatures to raise or lower the workpiece temperature. Here is how Rubinsky solved this problem:

Two Deming Figure 4511 Sump Pumps (one for each lead screw grinder) take used oil from the grinders. These Deming units handle oil and abrasives. They pump oil through a primary 10 micron, 27 element double bank filter. The filtered oil goes to a 750-gal settling chamber for aeration and settling. In the last stage of this tank there are two more Deming 4511 Sump Pumps which pick up the oil and pass it through secondary 32 element, 10 micron filters. After this second filtering the oil passes through a heat exchanger where it is cooled by water. Temperature of the water is constantly controlled with a five-ton refrigeration unit. When cooled to a desired temperature, the oil passes through a Bristol air-controlled blending valve. Here warm oil from the filter and chilled oil from the heat exchanger are blended together. Temperature is constant to within ¼°F.

The blending valve is connected with a recording chart near the operator of the grinding machine. He can see what his coolant and lubricant temperatures are at all times, and by simple valve adjustments vary the temperature to suit his grinding requirements.

Oil pours uniformly on the work being ground and in such quantity that the piece being worked assumes the temperature of the oil and remains at a constant temperature throughout the grinding process.

BUY U. S. SAVINGS BONDS TODAY

it was a fully automatic forging operation... until we started to forge

Even the best automatic forging machines can be slowed down by one simple thing. The steel you forge.

Unless the steel is really uniform, you'll be interrupting production to change the setup. These readjustments take time, limit the availability of expensive equipment—until it's hardly automatic any more.

With Timken® steel you get uniformity down to the last ounce. We take extra steps to make our steel uniform from bar to bar, heat to heat, order to order. For instance, we use the industry's first magnetic stirrer. It distributes alloys evenly, works the slag constantly at a uniform temperature. And we eliminate guesswork by using the industry's first direct-reading spectrometer to insure more uniform grain size and chemical composition.

What's more, we treat each order individually. Right from the start, an order is processed with the customer's end use in mind.

Why not insure wide-open, fully-automatic operation with your machines? Specify Timken fine alloy steel. You'll get uniform results every time without paying a penny extra. The Timken Roller Bearing Company, Steel and Tube Division, Canton 6, Ohio. Cable address: "TIMROSCO".

TIMKEN *Fine Alloy* **STEEL**

TRADE-MARK REG. U.S. PAT. OFF.

SPECIALISTS IN FINE ALLOY STEELS, GRAPHITIC TOOL STEELS AND SEAMLESS STEEL TUBING

CIRCLE INFORM-A-GRAM KEY NO. 87

G. E. Announces
Six Numerical Positioning Control "Packages"

Small-lot automation received a boost with General Electric Co.'s recent announcement of a complete line of "packaged" numerical positioning controls. The six pre-engineered packaged units are designed to provide semi-automatic or fully-automatic control of point-to-point positioning and to direct from one to five linear or rotary motions of a machine or machine tool. They're designated Mark I-M, I, II, III, IV, and V according to the number of motions they can perform.

Reportedly less expensive than comparable custom control systems, prices range from $5,140 for the Mark IM to $32,990 for the five-motion Mark V. They can be applied to a wide variety of operations, from the simplest bending or punching chores to complex, high-accuracy functions requiring five-motion control.

"We feel this new concept will bring the benefits of automation within the reach of hundreds of new industries," said Dr. L. T. Rader, general manager of G. E.'s Specialty Control Department, when the units were introduced, "bringing with it what we have termed flexible automation.

"For instance, we applied our first Mark II to a six-spindle general-purpose drill press in our own operation and have realized production savings ranging from 32% to 95% on a variety of jobs. A report on another Mark II unit shows that on a single job, lead time was cut by 60%, production time reduced by 50%, and $2,000 saved in fixture cost. This means that the small-lot manufacturer who heretofore felt automatic control was economically unfeasible," continued Dr. Rader, "can now afford this low-cost, flexible automation in his plant."

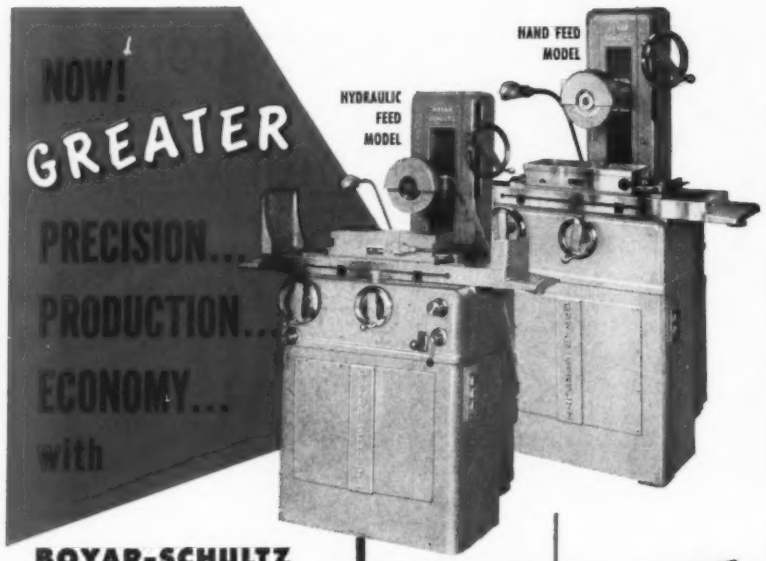
From numerical data input introduced from manually set decade switches or from punched tape, members of the "Mark Family" will control the position of one to five motions, and will initiate the action of the machine at the proper time following positioning.

Motors, operator's control, position pickup units, and tape reader are included in each of the packages. Punched tape control of non-standard auxiliary functions is accomplished by the addition of relays and other necessary electrical devices.

The compact units offer speeds up to 200 ipm or faster with reduced accuracy. The controls provide for sequential or simultaneous linear and rotary positioning and have electrical accuracies of ± 0.0005″ at travel lengths up to 99.999″. A simple modification permits length of travel up to 399.999″.

Mark I through V units operate from numerical data stored in standard, eight-channel, 1″ wide punched tape or manually-set decade switches, and are capable of semi- or fully-automatic operation. Mark I-M is directed from manually-set decade switches only, and is semi-automatic in operation.

Horsepower ratings are essentially unlimited, and four choices of drives are available. Special thymotrol adjustable-speed d-c motor drives, d-c positioning motors controlled by amplidynes, electro-hydraulic motors, or electro-hydraulic pistons.



BOYAR-SCHULTZ 6x18 SURFACE GRINDERS

Available in Hydraulic and Hand Feed models.

These machine tools are of the most advance design, fully proved and enthusiastically endorsed by users who must have accuracy as well as production performance.

Exclusive features include heavy duty precision spindle; vertical column assembly supported by horizontal cylindrical ways; closely grained nickel alloy table with longitudinal ways of hardened and ground tool steel; vertical feed assembly with precision ground worm gear perfectly fitted to bronze gear for easy operation.

Hydraulic operation is accomplished by controls A and B above. These controls automatically disengage longitudinal and cross feed hand wheels.

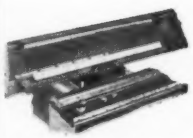


Table ways, one V and one flat are ground and hand scraped. They travel on hardened and ground tool steel ways.

Precision screw on vertical feed assembly turns through a perfectly fitted steel worm and bronze gear, operating in grease packed, sealed gear box.

Unique column assembly combines vertical and cross feed travel. Sturdy vertical column has oversize bearing surfaces. Hardened and ground cylindrical ways provide accurate long wearing surface for cross feed travel.

Write, wire or call. We'll be glad to SHOW you what this fine grinder will do.

BOYAR-SCHULTZ CORPORATION

2012 South 25th Avenue
Dept. ZN, Broadview, Illinois

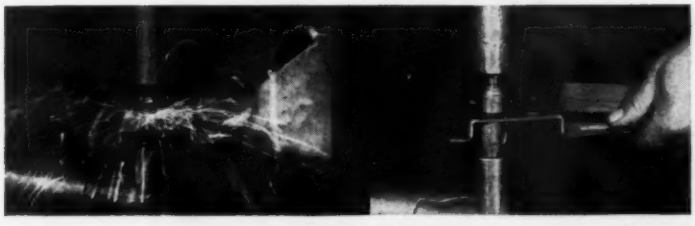
CIRCLE INFORM-A-GRAM KEY NO. 88

PARKER-KALON, originators of the Self-tapping Screw, has now developed the **P-K® RIMGUARD* WELD SCREW.** It has a strong, protective rim and four weld projections. Companies who have already tried the **RIMGUARD** tell us it is the best weld screw they've ever used.

The new rim minimizes "flash" and "spatter". Finished work is cleaner, neater—shows no burn or discoloration. And operators like the new protection. The **RIMGUARD** requires less current, limits the amount of pressure applied during the fusion stage, controls the flow of the fused projections, and reduces the possibility of "flower-out" or "blow-out".

Try the new **P-K RIMGUARD WELD SCREW** for yourself. You'll find the new 4-Projection design assures proper weld area, develops the full strength of the weld with both thin and heavy gage steels. The **RIMGUARD** gives better seating of the head against the work. Openings between head and work are eliminated, thus providing protection against moisture condensation and corrosion—a distinct advantage where work is to be enameled or porcelainized.

P-K RIMGUARD* WELD SCREWS are available from your nearby Industrial Distributor in Type WS-T with projections on top the head and Type WS-U with projections under the head. Sizes or finishes other than stock items can be supplied on special order. P-K Field Engineers will be glad to help solve unusual application problems.



Welding operation with ordinary weld screw. Note flash and spatter—a hazard to personnel and a source of discoloration.

Rimguard minimizes spatter—controls flow of fused projections—safeguards both the work and the operator.

SOLD EVERYWHERE THROUGH INDUSTRIAL DISTRIBUTORS

Prompt service—In any quantity

PARKER-KALON® Rimguard* weld screws

PARKER-KALON DIVISION, General American Transportation Corporation, Clifton, New Jersey

Manufacturers of Self-tapping Screws, Socket Screws, Screwnails, Masonry Nails, Wing Nuts and Thumb Screws *Pat. Pending

CIRCLE INFORM-A-GRAM KEY NO. 89

PLEASE, MR. PENNINGTON . . . . .

remember that when you so gallantly (?) write about women drivers (page 51) that some women (editors, typists, proof-readers, et al) see your priceless words before publication. Priceless, that is, in the sense that they're not worth anything.

Therefore, and because you at least called us "fair ladies" may we ask, in all fairness:

?WHO — like a country boy, got clobbered in Detroit by making an illegal left-hand turn?

?WHO — carries "fingerprints" on both sides of his car, evidencing that his garage door trim is painted white?

?WHO — was sentenced by a Minneapolis judge to attend a police traffic school on account of getting picked up for speeding three times in five days?

?WHO — knocked over an ornamental, off-the-driveway lamp post in his boss's yard — of all places?!

?WHO — got tagged for one-headlight-night-driving?

?WHO — slips the clutch instead of shifting, in order to get up his steep office driveway?

?WHO — incidentally, still drives the old hand shift just because his grandfather did?

?WHO — has had to call the Auto Club (more than once) in order to get extricated from his own backyard?

?WHO — has a daughter who thinks she is a better driver than he is?

?WHO — Hoo-hoo to you, too! So there!

(unsigned)
Huebner Publications' Fair Lady Drivers.

CIRCLE INFORM-A-GRAM KEY NO. 90

"ADJUSTABLE STROKE" MIDGET Air-Clamp® CYLINDER

®TRADEMARK

Now—put pressure where it's wanted instantly and cheaply, with Mead's powerful new midget air cylinders (1" bore, single-acting, spring return—horizontal and vertical). Stroke is adjustable. Cut costs—use 'em singly or in groups to move, hold, press or eject small work pieces; to close and open large jigs, forms, fixtures. They'll replace human fingers and mechanical clamps in countless routine jobs.

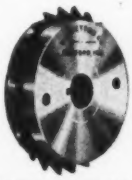
Catalog Free!

Write for new fact-and-picture-packed Air Power Catalog—or ask your nearest Mead Man!

MEAD
SPECIALTIES COMPANY
4114 N. Knox Ave., DEPT. HA-108
CHICAGO 41, ILLINOIS
PATHFINDER IN AIR POWER AUTOMATION

CIRCLE INFORM-A-GRAM KEY NO. 911

PRECISION CUTTERS!



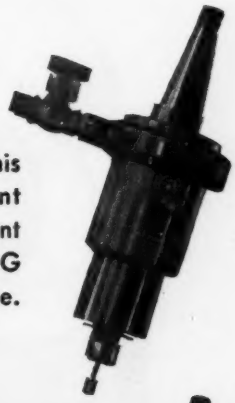
MADE TO YOUR EXACT SPECS... SOLID CARBIDE, OR CARBIDE TIPPED!

Why put up with stock cutters, when made-to-order cutters cost no more? Cutters designed for specific gang-milling, slotting, venting, slitting or grooving operations in various diameters and thickness to suit YOUR needs exactly. Fast service: all component materials carried in stock. Top-flight reputation for dependability built since 1888. Furnish complete specs, quantities desired and material to be cut when requesting prices. Write for Bulletin No. 51

W. F. MEYERS CO., INC., BEDFORD, INDIANA

CIRCLE INFORM-A-GRAM KEY NO. 912

HOLES JIG GROUND with Vulcanaire



Provide yourself with this inexpensive* instrument for use on your present equipment and JIG GRIND with a guarantee.

A seven station die from Vulcan's contract Tool Room (Your Tool Room in Dayton).

Standard sized punches and buttons were used. But since forming and piercing operations were involved, hardening of the sections was necessary followed by JIG GRINDING. Result: Close tolerances held easily and perfect progression throughout — another satisfied customer.

*Vulcanaire equipment pays for itself on the first job.

Borrow our instructive 11 minute movie on Jig Grinding.

SERVICES OF YOUR TOOL ROOM IN DAYTON
ENGINEERING • PROCESSING • BUILDING • TOOLS
DIES • SPECIAL MACHINES • VULCANAIRE JIG
GRINDERS • MOTORIZED ROTARY TABLES • BREHM
"SHIMMY" AND RELATED DIES • AUTOMATION

VULCAN TOOL COMPANY
741 Lorain Ave., Dayton 10, Ohio

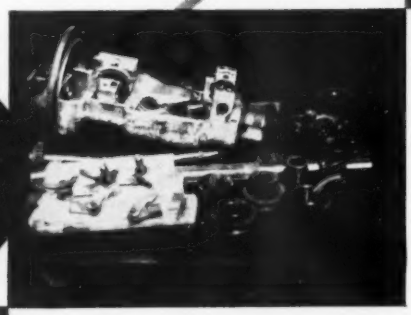
VULCAN tools

CIRCLE INFORM-A-GRAM KEY NO. 913

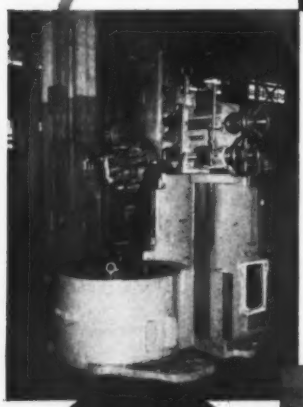
BULLARD

rebuilds from the ground up

Yes — we disassemble each machine right down to the bed.



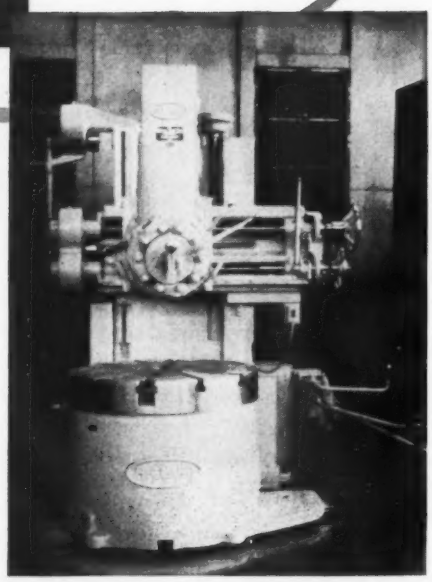
Each individual piece is cleaned and inspected



and if found serviceable is re-used, if not, it is replaced.

What does this mean to You?

1. Thorough workmanship by the same skilled craftsmen that built the machine.
2. Only "original equipment" precision replacement parts, where necessary.
3. Fast service.
4. One year guarantee on all parts replaced — including labor.



If you're planning to rebuild any of your Bullard machines contact your nearest Bullard Sales Office or Distributor for a quotation or write

BULLARD

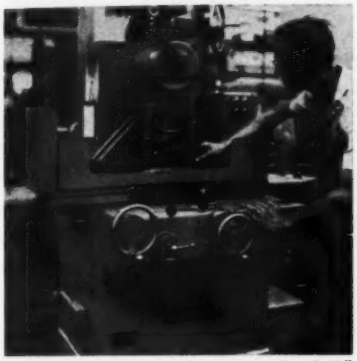
THE BULLARD COMPANY BRIDGEPORT 9, CONNECTICUT

CIRCLE INFOM-A-GRAM KEY NO. 92

HIGH TABLE SPEED OF NEW GRINDER REDUCES GRINDING TIME

Among the many new features designed into the new Norton 6" x 18" Type S-3 hydraulic surface grinder, the most significant is the substantial increase in table speed. The maximum table traverse speed of 125 fpm makes possible a 50% reduction in grinding time over similar machines, and reduces burning, checking, and cracking of the work. This is particularly true when grinding heat sensitive steels.

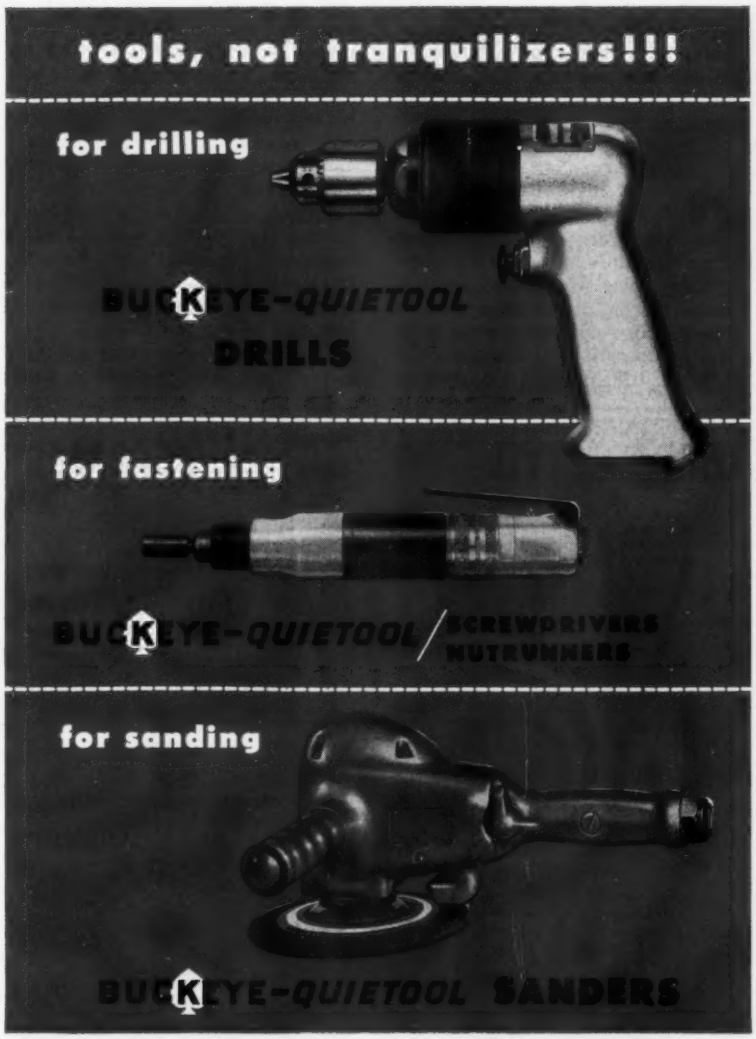
Another exclusive feature of this grinder is its capacity for grinding a workpiece as high as 15" above



the work table with a standard 8" dia grinding wheel.

Other improvements are: Two long and wide hand scraped base ways provide minimum bearing pressure per square inch; straight cross tracking of saddle is assured by a unique guide rail and preloaded ball bearing roller construction — important in grinding square shoulders; long vertical ways provide rigid support at the maximum 15" height; cross feed at each table reversal is easily set by a graduated dial-type knob; two-speed vertical handwheel, graduated in increments of 0.0001", provides rapid movement for positioning and a fine feed; contoured wet attachment splash guards allow operator to see work and wheel easily; centered reversing lever permits operator to line up table dogs with the ends of the work; and table dogs are set with finger pressure.

Finger-operated latches at the ends of the sliding table disengage the hydraulic cylinder to permit easy manual operation of the table. The table traverse handwheel is interlocked with the hydraulic start-stop lever to prevent rotation of the handwheel during hydraulic-powered motion. The sliding table and saddle ways are automatically lubricated.



Air tools are built for working, not for sleeping. Even the amazingly muffled Buckeye QUIETOOL drills, sanders, screwdrivers and nutrunners won't lull you to sleep! But they do their work with precise efficiency, and make less exhaust noise in the process than you ever believed possible of an air tool.

How come? Because in designing these new tools, we included the muffler as an integral part, designed into the tool from the start.

There are many more reasons why these new Buckeye tools operate so quietly, stuff about decibels, sones, microbars, etc. . . . but you'll be more interested in the results than in how we came by them.

A letter or postcard, with your name, your company name and address, and the single word QUIETOOL, will bring complete information and, if you like, an obligation-free trial-test right in your own plant.

Why AIR Tools?

Because air is everywhere, just waiting to be put to work . . . because continuous operation can't possibly harm an air tool . . . and because, if you're using Buckeye air tools, you can almost forget about tool maintenance.

For a special air tool for a difficult job, or a standard air tool for routine work, your best buy is Buckeye. Write for our new catalog.

Buckeye Tools CORPORATION

CIRCLE INFORM-A-GRAM KEY NO. 93

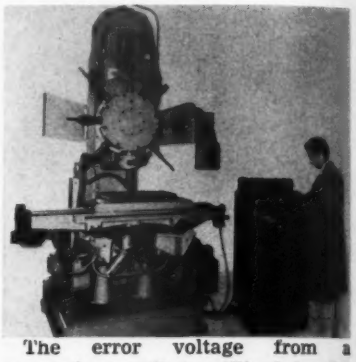
TAPE-CONTROLLED 8-SPINDLE TURRET DRILLING MACHINE

Automatic numerical tape controls are now applied to the large 8-spindle Burgmaster turret drills as well as the 6-spindle machines. Burg Tool Manufacturing Co., Inc., uses an Electropoint control system or a General Electric tape control unit modified for their machines to convert the conventional drilling machines to automatic control. They have drilling and tapping capacity of 1½" dia in mild steel.

The machine controls permit four modes of operation: 1) manual control from the Burgmaster control station — used for setting up and individual operations; 2) semi-automatic control employing the tape reader, which is under full operator control, for checking out a new tape; 3) automatic operation for regular production, with all functions of the machine directed by the tape control system; and 4) automatic control with standard Burgmaster automatic hydraulic controls and the tape system console shut down.

Field reports show that one large aircraft company realized a potential savings of $51,000 for the first year of operation, on a $21,240 investment.

The standard table has an 18" x 30" travel and is mounted to the main column on dovetail ways and supported by double jack screws. It rides on a combination of flat and v-ways which are double the table length to give complete support throughout the entire table travel. Each axis of the table is driven by ½-hp servo-motors through 5-pitch lead-screws of circulating ball design. Lead accuracy is 0.0005 ipf.



The error voltage from a comparison unit is utilized by the servo control to govern the speed of the drive-motor in such a fashion that little or no overshoot occurs. Rapid traverse is 100 ipm. Since the servo control completes a closed loop, the table is always positioned accurately.

Once positioned, the table is locked in place by air clamps for the machining operation. The turret-slide is locked out until the table is positioned, after which it will approach rapidly, feed, retract, and index automatically.

DEATHS

Frederick H. Chapin, 83, chairman of the board of The National Acme Company, died in Cleveland this past summer.

Melvin H. Emrick, 47, president and board chairman of Ettco Tool & Machine Co., Inc., Brooklyn, died this summer at his home in Manhasset, Long Island.

Kenneth Cooke Brownell, 55, chairman of the board of American Smelting & Refining Company, died last summer at Columbia Presbyterian Medical Center, New York City.

William D. Goad, 43, manager of Specialty Product Sales for Tube Reducing Corporation of Wallington, N. J., died suddenly during the summer.

LEMPCO STYLE "M" and "L" DIE SETS

NEW

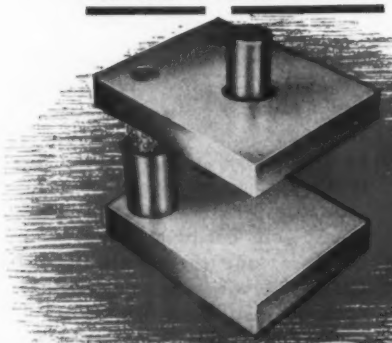
ALL-STEEL
DIE SETS AT THE PRICE OF
CAST IRON!

BALL-BEARING ANTI-FRICTION PIN BUSHINGS

EASIEST AND FASTEST TO ASSEMBLE OR DISASSEMBLE

PRECISE ALIGNMENT FOR MILLIONS OF STROKES

ZERO MAINTENANCE; ONLY CUP GREASE AT GRINDING TIME



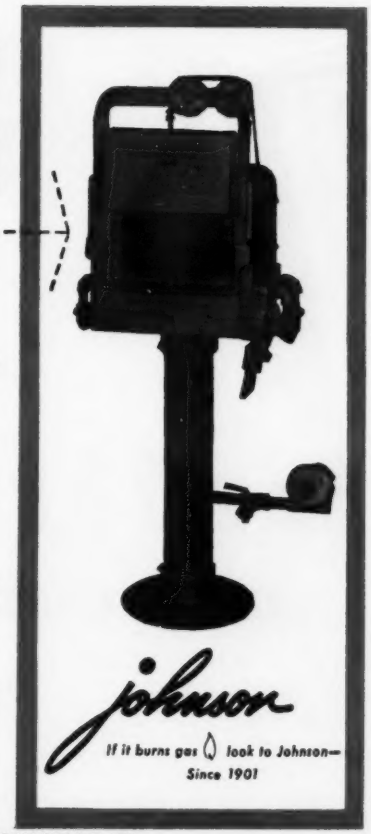
NOW, Lempco's line of Precision Ball-Bearing Die Sets, includes new low-priced *all-steel* sets, Style "M" and "L", at the price level of *friction-type cast iron* die sets. Better write TODAY for New Low Prices!

LEMPCO INDUSTRIAL, INC.
DUNHAM RD., BEDFORD, OHIO

WHERE QUALITY CONTROLS!

CIRCLE INFORM-A-GRAM KEY NO. 94

HEATS FAST SAVES TIME



johnson

NO. 142 HEAT TREATING FURNACE

Start heat treating high speed and carbon steels while other furnaces warm up. Powerful burners in this efficient furnace get heat up to 1300°-2350° F. range in minutes. Temperatures accurately and quickly regulated. Ratchet-operated door opens upward — no need to open fully every time. High temperature refractory-lined firebox keeps heat uniform — 7" by 13" by 16½". 200,000 BTU's per hr. Carbofrax hearth, G.E. Motor and Johnson Blower included ..... F.O.B. Factory $358.00

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Cedar Rapids, Iowa

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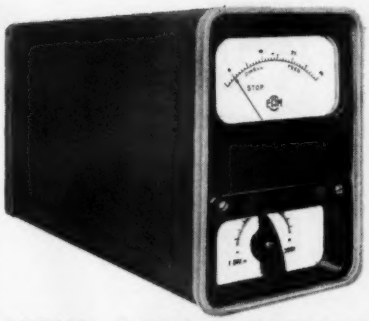
If it burns gas look to Johnson— Since 1901

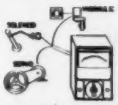
CIRCLE INFORM-A-GRAM KEY NO. 951



NEW ATTACHMENT!

Tracing—In Process

Automates machine tools and SIZE CONTROL by *constantly measuring workpiece during process.*



Quick Installation

We GUARANTEE!—to repeat retraction of your grinding wheel ±.000020".

The new Electro-Autosizer will feed back I. D. data from a finished piece to machine controls so that the mating workpiece being ground fits exactly... in one chucking.

Use it also for automating post process inspection.

Precise Diameter Control

For large or small lot jobs, with loose or extra fine tolerances, the Electro-Autosizer attachment is your economical key to Automation.

E. A. M. was the first to supply electronic size control in the machine shop.

write for complete information

ELECTRO-AUTOSIZING

EAM *Machine Corporation*
8 William St., Closter, New Jersey

CIRCLE INFORM-A-GRAM KEY NO. 953

STYLE AND SIZES FOR ALL MACHINES ON WHICH THREADS ARE CUT

On Brown and Sharpe, and other automatics

INSERT CHASERS SAVE UP TO 33%

Insert chasers are like safety razor blades: they cost so little that you can throw them away when dull. Or, for utmost economy, you can resharpen them over and over again. Only a flash grind is required. For less than $50 you get a dozen sets of ¾—16 insert chasers, each set ground ready to go. You will be amazed at the quantity of threads they will cut, even to Class 3 specifications, with a minimum of downtime.

FREE: "Unified and American Screw Thread Digest"

THE EASTERN MACHINE SCREW CORPORATION 29-49 Barclay St., New Haven, Conn.

CIRCLE INFORM-A-GRAM KEY NO. 952

Capacity
#0 — 5/16"
#8 — 1/2"

Complete
$30.00
(Slightly higher on West Coast)

GRIMES HAND TAPPER

(with adjustable chuck)

For use with your drill press, lathe or vertical miller. Eliminates the need for expensive tapping machines.

- **Chuck takes up to ½" taps.**
- **Precision tapping everytime.**
- **Tap breakage minimized.**
- **Lifelong gun-metal finish.**
- **Complete with hardwood box.**

Ask your distributor or write direct for complete details.

Grimes TOOLS

THE GRIMES ENGINEERING CORP.
CHESHIRE, CONN.

CIRCLE INFORM-A-GRAM KEY NO. 954

NOW all SUPERIOR die sets have Superfinish GUIDE PINS

HIGH LUSTRE MICROFINISH (2-5 Micro Inches)

Results in

1. **Maximum Surface Hardness**
2. **Increased Bearing Surface**
3. **Longer Pin and Bushing Life**
4. **Greatly Reduces Possibility of Scoring**
5. **SMOOoooother Action**

The process of Super Finishing removes the soft outer skin (appx. .0002-.0003) caused by the heat induced as a result of grinding.

Super Finish eliminates charging which is common to pins lapped with an abrasive compound.

Super Finishing, long a prerequisite in the Automotive and Aircraft Industry for precision bearing surfaces, is now a standard on Superior guide pins. With Super Finished guide pins ideal clearances can be maintained due to a greater bearing surface.

For Fast Local Service Call These Superior Representatives

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Winter Park, Fla. 4-0464
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Plants at
Milwaukee, Wis. Mitchell 5-6037
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another die set advancement by **SUPERIOR** STEEL PRODUCTS CORP. 2754 S. 19th ST., MILWAUKEE, WIS.

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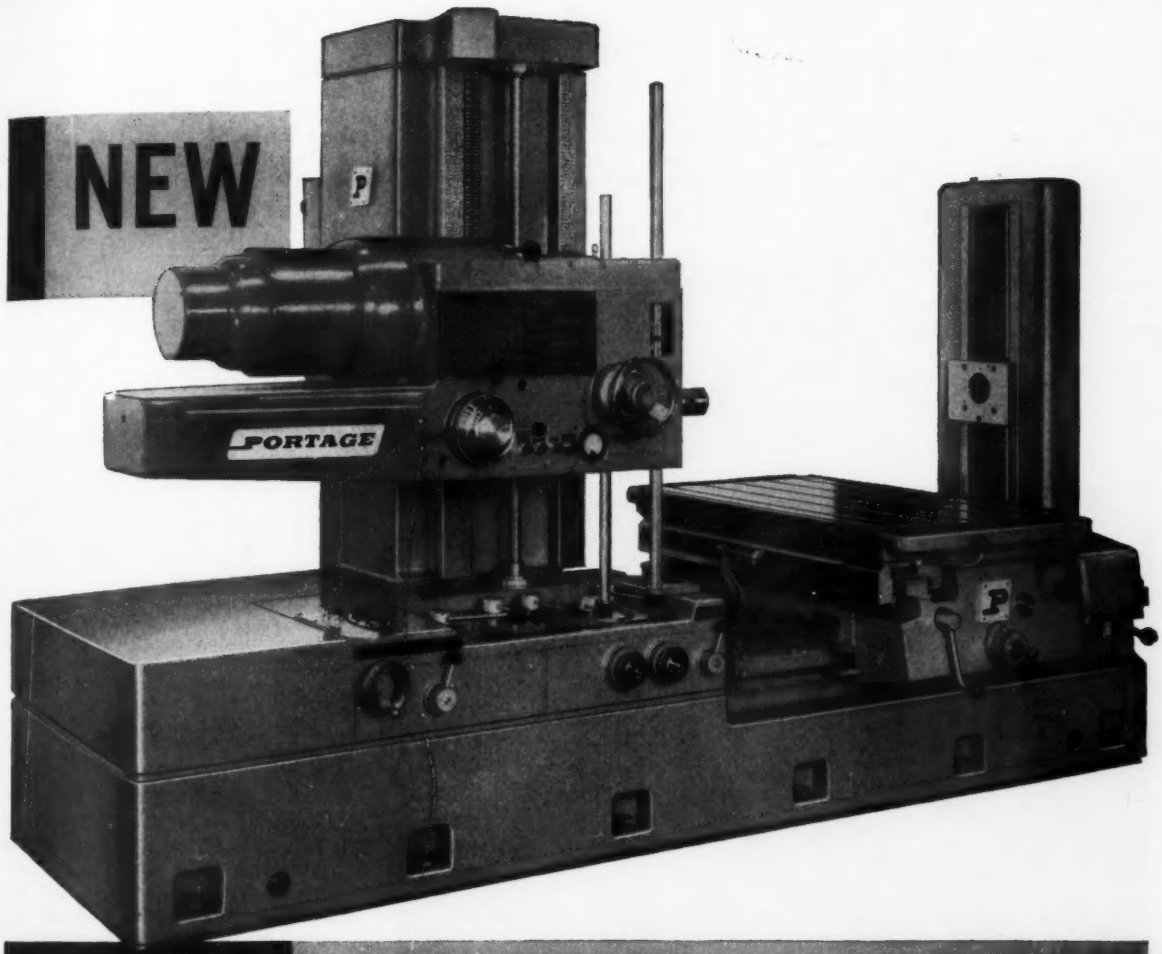


PORTAGE...3" diameter horizontal milling, drilling and boring machine

Literature, just off the press, covers features and specifications.

Mr. Buyer... here's a 3 inch bar machine you can't afford not to investigate. It's new from the top of the column to the bottom of the base... All new speeds and feeds, plus a versatility of job applications make it a real money maker. All new construction features offer a truly strong, rugged machine... and the pay-off... it's priced amazingly low, every shop can afford one ...write, wire or phone for complete information.

THE PORTAGE MACHINE COMPANY

1036 SWEITZER AVE., AKRON 11, OHIO
PORTAGE 2-0211 TWX AK266

BUILDERS OF PRECISION MACHINE TOOLS, SPECIAL AND PRODUCTION MACHINERY SINCE 1916

CIRCLE INFORM-A-GRAM KEY NO. 97

SPECIAL STEELS CUT MACHINING TIME, EASE DEEP DRAWING

Machining time on clamping rings has been reduced, and special formability requirements have been met, by users of two types of Jones & Laughlin steel.

Use of hot extruded, cold drawn steel bars for split clamping rings with toothed segments has resulted in a 22% cut in machining time and an 18% cost saving for American Bosch Arma Corp., makers of fuel injection pumps.

The 10′ - 12′ bars are precisely shaped by J&L to eliminate all external machining of rings except cutting the teeth. The two milling and one grinding operations on ring blanks of standard round stock are not required with the shaped bars.

Blanks ⅜″ wide (Fig. 1) are cut from the AISI type C1144, 1-1/32″ dia steel bars on a 1-5/8″ Gridley automatic screw machine, which

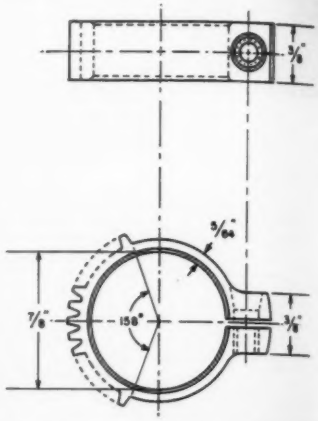


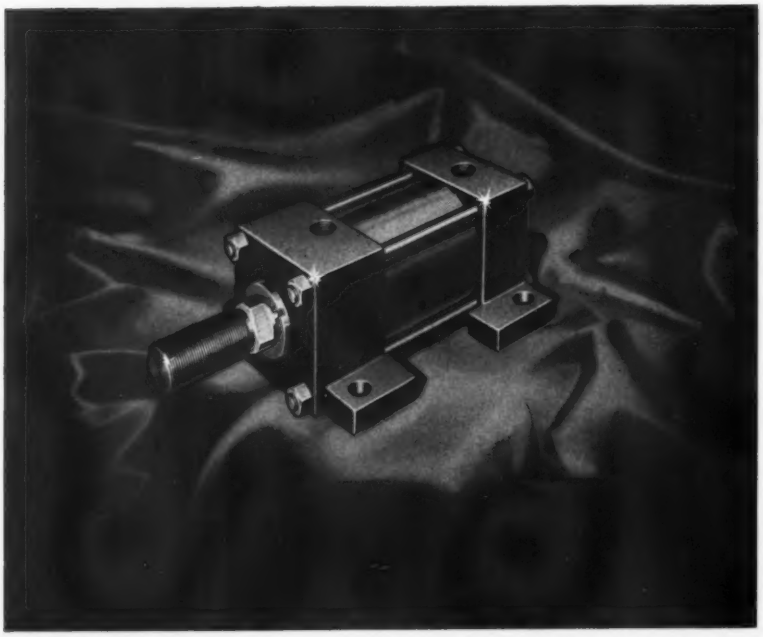
Fig. 1. Drawing shows clamping rings, machined from J&L extruded bars to eliminate all external machining except cutting of teeth.

performs the same six initial operations as were done on the 1-½″ round stock. Subsequent machine operations put 15 gear teeth in the 158° segment; drill and tap a lockscrew hole in the ⅜″ wide projection of the ring; and cut the ring by a milled slot through the center of the projection perpendicular to the lockscrew hole.

Fig. 2. A formed piece is removed from the 450-ton Bliss press, while the succeeding piece is about to be formed.

Deep drawing the front cross member of automobile frames and meeting the specifications for multiple radii and points of strength are accomplished at the same time by Midland-Ross Corp., using J&L hot rolled drawing quality sheet steel.

The high formability hot rolled sheet steel is sheared to size, blanked, deep drawn in three passes in 450-ton Bliss presses (Fig. 2), and finally pierced and provided with a cover plate.



Illustrated—Logan Super-Matic Cylinder Meets J.I.C. Standards

Look to Logan

the ultimate in hydraulic cylinder design

FREE SEND FOR THE "LOGAN CALCULATOR"

MEMBER: Natl. Mach. Tool Builders' Assn.; Natl. Fluid Power Assn.

LOGANSPORT MACHINE CO., INC.
844 CENTER AVENUE, LOGANSPORT, INDIANA

PLEASE SEND COPY OF CATALOG:

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- ☐ 100-2 MILL-TYPE AIR CYLS
- ☐ 100-3 AIR-DRAULIC CYLS.
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CIRCLE INFORM-A-GRAM KEY NO. 98

drill · ream · chamfer spot-face · center · deburr

do all these operations

and more

***with the* SERIES 26**

DUMORE®

AUTOMATIC DRILL UNIT

Only

$550* *Complete*

Catalog No. 26-062
½ hp., 208/220 V., 50/60 cy. 3 phase, totally enclosed motor 1440/1725 rpm

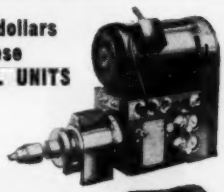
***F.O.B. Racine**

This unit is a quality engineered, compact driving head for a wide variety of machining. It is fully automatic with built-in basic electrical and pneumatic controls. It is ideal for long production runs or multiple set-ups where frequent changeovers are not necessary.

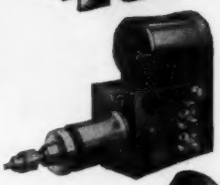
It is a powerful, versatile, all-purpose unit that lets you use it where you need it—on drill presses, fixtured set-ups, bench mounted; or added to special-purpose building-block production machines, transfer stations and other automatic machining systems. Keeps right on working on set-up after set-up!

This special Dumore nose mounting bracket is your key to all-purpose machining—*anywhere*. It permits fast, easy mounting in any position, angle or direction in single set-ups, or multiple machining operations in sequence. Changeovers, when necessary, are made quickly, speedily. Return to original set-up is equally fast!

You can save hundreds of dollars in first cost alone with these DUMORE AUTOMATIC DRILL UNITS



Series 28
"Drill-N-Tap" Unit — 2 tools in 1 at the cost of only one. Drills or taps at the flip of a switch. Tap fits into chuck, no extra head required. Reversing motor removes tap, eliminates costly clutches. 265 to 4900 rpm. For long or short runs.



Series 24
Fully automatic with all controls built-in. Preselected speeds, feeds, depths. Ideal for varying runs and frequent changeovers.

Series 20
Automatic Drill Heads for high production drilling of small parts. Stops drill breakage. Built-in controls. No. 80 to 5/32" capacity.

DUMORE® **ALL-PURPOSE PRECISION METALWORKING TOOLS**

THE DUMORE COMPANY • 1304 Seventeenth St., Racine, Wis.

VERSA-MIL • DRILL-N-TAP UNITS • DRILLING UNITS • DRILL HEADS
MICRO DRILLS • DRILL GRINDERS • TOOL POST and HAND GRINDERS
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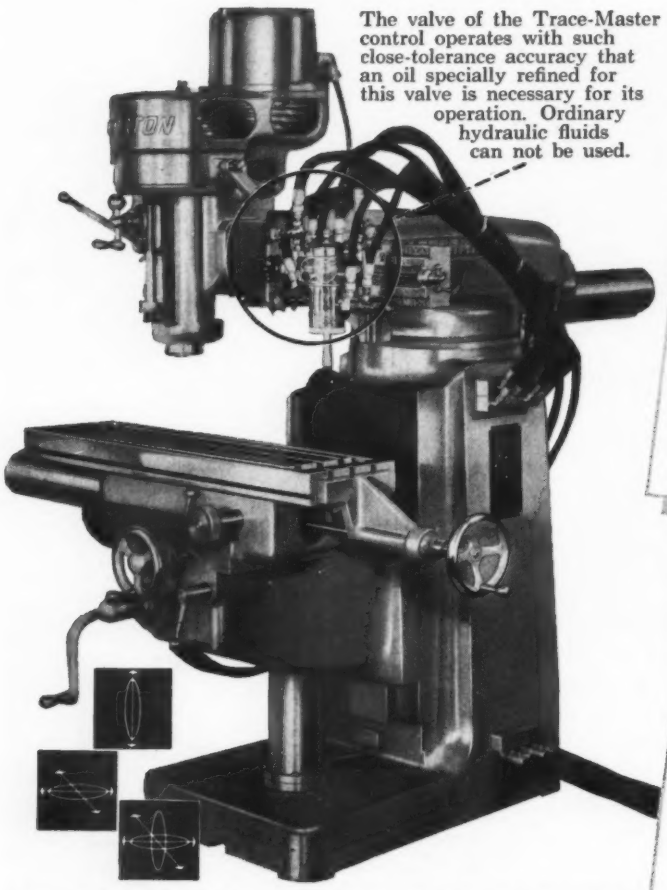
Your Name_____

CIRCLE INFORM-A-GRAM KEY NO. 99

Designed for the "Missile Age"

GORTON "Trace-Master" Mastermil

with exclusive combination of sustained toolroom accuracy and precision-built Trace-Master Hydraulic tracer control



The valve of the Trace-Master control operates with such close-tolerance accuracy that an oil specially refined for this valve is necessary for its operation. Ordinary hydraulic fluids can not be used.

Nowhere Else will you find this combination

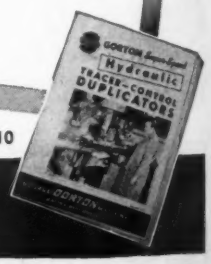
1. TWO H.P. spindle motor
2. Finest Milling Head in its class
3. 80 to 5,600 RPM spindle speeds
4. Rigidity . . . (2,800 lbs net weight)
5. Extra long saddle

Nowhere Else will you find this versatility

1. Production profiling
2. Scanning
3. Duplicating . . . die and mold work
4. Milling . . . conventional and climb
5. Boring

3 Models Available (1) 180° Vertical Hydraulic Feed to Knee (2) 360° Cross Hydraulic Feed to Ram and Longitudinal Hydraulic Feed to Table (3) 3D Hydraulic feed to knee, ram and table for 3-dimensional work.

Trace-Master controls can be furnished with the Model 1-22 Mastermil illustrated above or the Model 9-J Super-Speed Vertical Mill with single spindle, twin spindles and/or six inch higher column for additional vertical capacity.



Write for Bulletin 2771-1210

GORTON

SINCE 1893

GEORGE GORTON MACHINE CO.

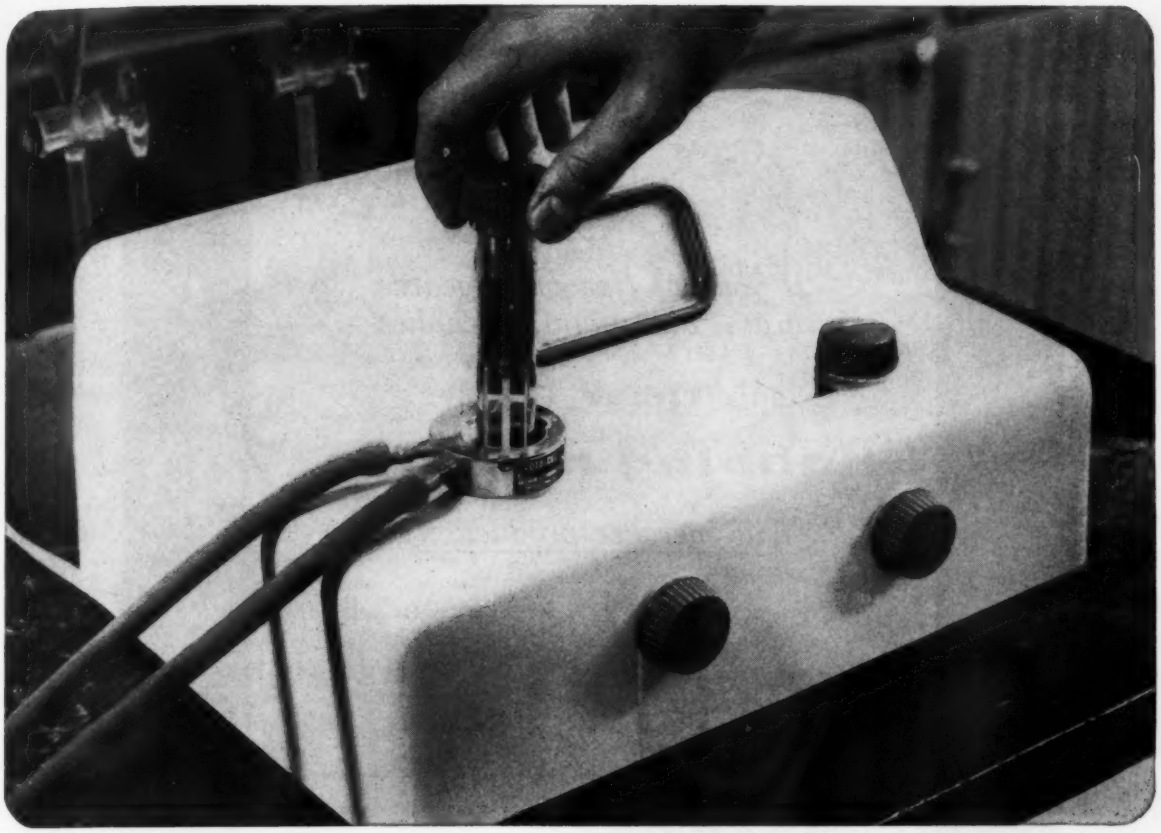
1210 Racine Street, Racine, Wisconsin

Tracer-Controlled Pantographs, Duplicators — standard and special . . . Horizontal and Vertical Mills, Swiss-Type Screw Machines, Tool Grinders, Small Tools and Accessories.

AS-1007

CIRCLE INFORM-A-GRAM KEY NO. 100

***Experience**—the added alloy in **Allegheny Ludlum** tool steels*



COLORIMETER (inherently extremely accurate) determines percentages of molybdenum, tungsten, cobalt and manganese in A-L tool steel to insure consistent, high quality.

Colorimeter measures exact chemical composition of Allegheny Ludlum tool steel melts

Accurate adjustment of alloys guarantees uniform heat treatment, predictable dimensional changes, reduced grinding, standardized machining operations.

Close control of molybdenum, tungsten, cobalt and manganese is at the heart of a good tool steel melt. In addition to the usual testing methods, Allegheny Ludlum's chemical laboratory checks these metals with Colorimetry because of its inherent, extreme accuracy.

On the basis of the Colorimeter's findings, it is possible to make carefully calculated furnace additions of ferro-alloys, insuring precise control over chemistry. This guarantees your receiving the *exact* analysis order after order, providing *uniformity of heat treatment, predictable dimensional changes, reduced grinding and standardized machining operations.*

WSW-7262

Colorimetry is but one step toward careful control over composition. Allegheny Ludlum also sets exacting purchasing specifications on raw materials and scrap. Quality Control checks all incoming orders to see that they conform with these specifications. Another guard toward your getting your exact specifications: each ingot bears a metal tab showing heat number.

Allegheny Ludlum stocks a complete line of tool steel sizes and grades. Call your nearest A-L representative; you'll get quick service and counsel on such problems as heat treating, machining, grade selection, etc. Or write for A-L's publication list which gives full data on the more than 125 technical publications offered. They'll make your job easier.

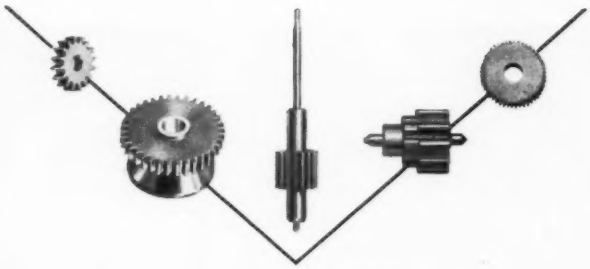
ALLEGHENY LUDLUM STEEL CORPORATION, Oliver Bldg., Pittsburgh 22, Pa. Address Dept. TP-10

ALLEGHENY LUDLUM

Tool Steel warehouse stocks throughout the country... Check the yellow pages

every grade of tool steel... every help in using it

CIRCLE INFORM-A-GRAM KEY NO. 101

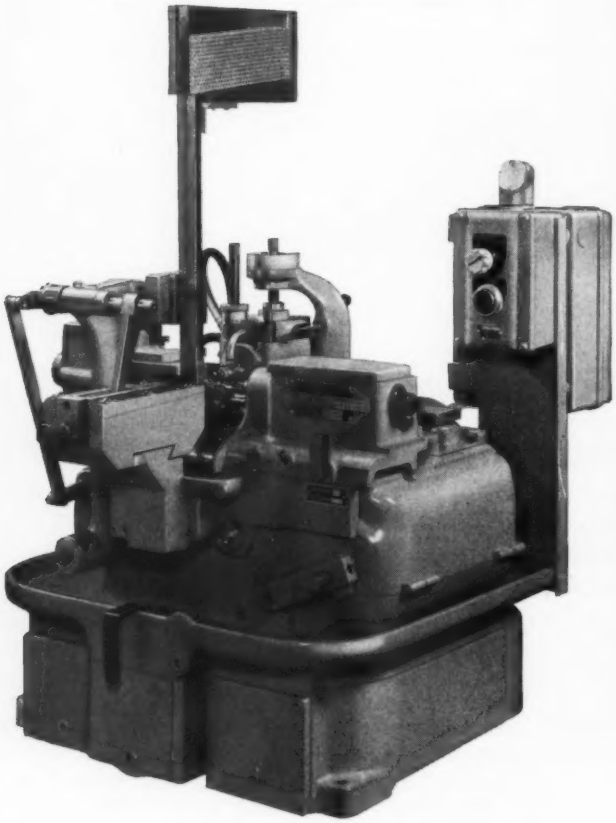


if you cut fine pitch gears
in brass, aluminum, phenolics—

this **new** no. 1-½

hobbing machine

will increase production!



This new No. 1-½ Hobbing Machine is designed with shuttle-type loading and complete automation for hobbing fine pitch watch and clock gears, pinions, meter gears, fuse pinions and similar parts produced in large quantities. It will handle automatically on a production basis many parts too small to handle manually. On such parts cut from brass, aluminum, phenolics — and even some grades of free-machine steel — the machine provides more hobbing efficiency, and increases production over any other equipment presently available. In some cases the machine is also adaptable to hobbing worm gears and helical gears up to 10°.

The new No. 1-½ is a high-speed machine which has been designed to give maximum production flexibility and output. A significant advantage of the machine is its low cost, and for this class of work, figured on a cost-per-piece basis, no other machine presently will compete (including both foreign and domestic).

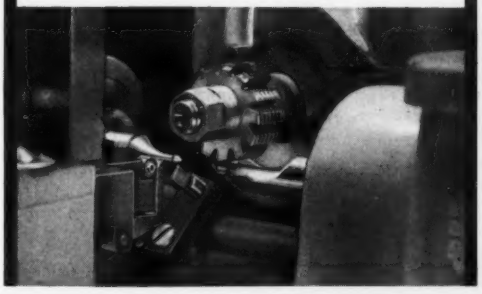
Depending on your production requirements, the machine is available in either standard hob speed range of 666 to 2040 rpm., or high hob speed range of 1332 to 4084 rpm. Shuttle-type loading reduces the automatic cycle time, and adapts the hobbing operation to various standard types of loading devices. Anti-friction bearings are used throughout the machine, and precision adjustments are provided for hob shifting and depth settings. Minimum maintenance and ease of adjustments make the machine a highly dependable production unit.

here's an example!

watch pinion hobbed every 4 seconds

One high speed No. 1-½ Hobbing Machine is producing 6800 watch pinions per 8-hour shift, using shuttle type loading and complete automation. Specifications are:

Brass Pinion — **8 teeth** — **56.667 DP**
Face Width — .142" **Hob** — .915" x ½" x .315"
Feed/rev. — .019" **Hob Speed** — 3590
Cycle Time — 3 seconds hobbing, 1 second loading
Production — 30,000 pinions per hob shift
120,000 pinions per hob sharpening



Send us your request on company letterhead, and we will send you complete information. Also have your production department send part prints or samples for production estimates.

BARBER-COLMAN COMPANY

81010 ROCK STREET • ROCKFORD, ILLINOIS

Hobs • Cutters • Reamers • Hobbing Machines • Hob Sharpening Machines

BARBER COLMAN

CIRCLE INFORM-A-GRAM KEY NO. 103

BESLY

X-PRESS®

create

form INTERNAL THREADS without cutting in...

COPPER	LEADED STEELS	DIE CASTINGS
BRASS	ALUMINUM	OTHER DUCTILE METALS
ZINC	LEAD	

- **Eliminate tap breakage due to chips**
- **Produces stronger threads by compacting metal**
- **No cutting edges to wear down**
- **Provide fewer tool changes for more pieces per shaft**
- **No chip interference permits tapping to bottom of blind holes**
- **Reduce plating failures, no chips in bath**
- **Drill breakage reduced especially in smaller sizes, because larger tap-drills used**

CONVENTIONAL TAPPING METHOD
Produces chips that may clog flutes, cause loading. Result—excessive breakage.
Grain lines of metal are cut.
CHIPS

BESLY X-Press Tapping is a cold forming or swaging process for producing internal threads in ductile metals. The desired thread is formed under pressure. The grain fibers follow the contour of the thread, as in good forgings. They are not cut away as in conventional tapping methods. Complete application details are available — see your Besly distributor, or send coupon. *Where this new tool can be successfully applied the results are* phenomenal! *It would pay you to try them yourself — NOW!*

Engineering, Service and Specials . . . are a Besly Specialty

BESLY-WELLES CORPORATION

Est. as C. H. Besly & Co. 1875

128 Dearborn Ave., South Beloit, Illinois

TAPS phenomenal cost savings

4 to 1 • 10 to 1 • 15 to 1 SAVINGS

by these companies using the new BESLY X-PRESS TAPS®

AUTOMOTIVE PARTS PRODUCERS

• **Tail-Light Assembly** — Customer was experiencing a great deal of breakage using an 8-32 cutting tap in tapping zinc die cast tail-light assemblies. They switched their production to an 8-32 X-Press tap and now report that they are getting approximately 4 times their former tap life and have eliminated all chip problems. The chip problems that they had before resulted in high scrappage because of chips clinging to the surface during plating. This customer has now specified the X-Press tap for all tapped holes in their entire Die Cast Department.

• **Carburetor Main Bodies** — "At the present time, 8-32 X-Press taps are being used in 20 operations. The standard tap formerly used averaged 2009 holes per tap before replacement. Our tests indicate a life of approximately 10 times this amount per X-Press tap. These results also apply to the 10-32, 1/4-20, 1/4-28 and 1/4-32 X-Press taps.

"A test run on the Kingsbury machine producing choke housings showed the following results. 8-32 X-Press taps were placed in operation May 12, 1958. As of June 2, 1958, 30,000 pieces had been run with the holes meeting allowed tolerances," reports a large auto company.

• **Electrical Component** — Previous production using a conventional 1/4-28 L. H. 4-flute plug tap produced only 1,000 leaded steel parts. Chips in bottom of holes were causing excessive rejections. Operation consisted of blind tapping 5/8" deep on a transfer machine set-up.

By switching to 1/4-28 L. H. Besly X-Press tap production increased to 7,000 pieces. The elimination of chip cleaning operation resulted in an additional savings of $2800 a year. Total economy increased better than 7-to-1.

APPLIANCE MANUFACTURER

• **Leveling-Screw Part** — Production of the part is on an 8-station double vertical transfer machine (1-load, 2-drill, 3-tap, 4-unload) with only a maximum of 750 pieces produced by the use of conventional cutting taps. When X-Press taps were substituted the results were 7500 or more pieces produced, 10 times the production gained. Tapping of blind hole is 5/8" deep. Customer is delighted with results as he can now keep transfer machine running much longer than previously.

DATA PROCESSING CONCERN

• **Electrical Iron Part** — Former methods with the use of conventional 5-40 2-flute, crest relieved taps, produced only 200 average parts blind tapped on a Warner Swasey horizontal automatic screw machine. Tap breakage also ran a minimum of 12 per shift with usage as high as 30 dozen per week. When 5-40, PC-5 Besly X-Press taps were set up to do the same tapping operation, this company averaged 3,000 threaded holes per X-Press tap, a 15 to 1 better result.

ENGINEERING COMPANY

• **Aluminum Block** — This company was tapping 200 pieces per order and as a result of a change in tooling to the X-Press tap were able to reduce production time 1 1/2 hours on this job. They also feel that they are now saving between 16 to 18 hours on each 200 piece order, because no chips to remove.

Complete Details Furnished on Request

SEE YOUR BESLY DISTRIBUTOR or send coupon

BESLY

Grinders and Abrasives • Taps • X-Press Taps • Drills • Reamers • End Mills • Tool Bits • Gages • Carbide Tipped Tools, Blanks, Lapped Toss-away Inserts, Holders

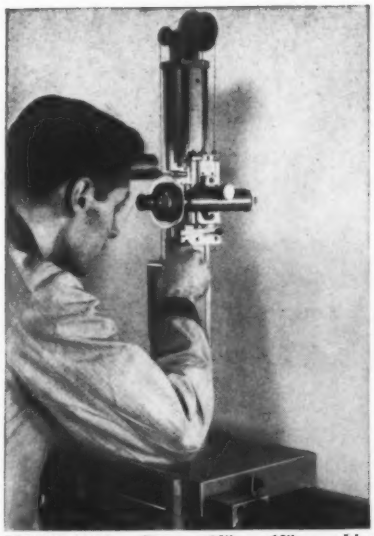
CLIP TO YOUR LETTERHEAD

Send X-Press Tap data.. ☐ Carbide Catalog ..... ☐

Send Tap Catalog..... ☐ Gage Catalog ..... ☐

Your Name_____

CIRCLE INFORM-A-GRAM KEY NO. 105



M1238-1818 — *Range 18" x 18", working distance 9" to infinity. Reads to 0.001" up to 24" working distance. Protractor ocular reads to 3 minutes of arc. Image is erect.*

Cut inspection time in half

with new Gaertner

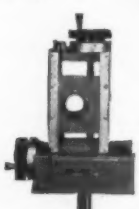
Coordinate Cathetometers

These convenient, reliable optical instruments permit making precise coordinate measurements in a vertical plane. The two dimensions are measured with one setting, object does not have to be rotated. Inspection time is cut in half and resetting errors eliminated.

Versatile Gaertner Coordinate Cathetometers are ideally suited for precision measurements on large objects; also objects or points in recessed, remote, or inaccessible locations. Applications include measuring jet engine sections, complicated castings, printed circuits, bolt holes and bosses on large piece parts, traces on cathode ray tubes, etc.

Because these are optical rather than mechanical measuring instruments, you make non-destructive measurements without contact, distortion, or concern about pressure being applied to the object when making a setting. Instruments available in English or Metric system.

M1236-46 —
Horizontal range 6", vertical range 4". Reads to 0.0001", working distance 5" to infinity.



M1236-22 —
Range 2" x 2", reads to 0.0001". Working distance 5" to infinity. Shown with 19 mm mounting rod, and without telemicroscope. Instrument permits precise coordinate movement of other objects such as photo cells, probes, etc., in place of telemicroscope.

Write for Bulletin 188-53 & 194-57

The Gaertner Scientific Corporation

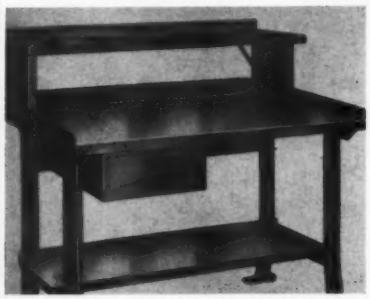
1242 Wrightwood Ave., Chicago 14, Ill.
Telephone: BUckingham 1-5335

CIRCLE INFORM-A-GRAM KEY NO. 1061

Products & Processes

PRODUCTS & PROCESSES & PRODUCTS & PROCESSES & PRODUCTS & PROCESSES & PRODUCTS & PROCESSES & PRODUCTS

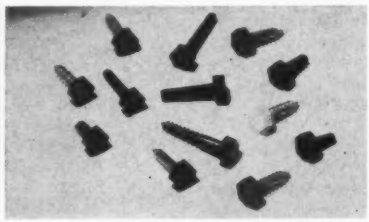
The Compact 48" Workbench, introduced by Lyon Metal Products, Inc., Aurora, Ill., is ideal for shops where work space is limited. Standard bench accessories include



shelf, riser, electrical outlet strip, back and end stops, channel-type stringer, and bench drawers. Write to the company for more information, or — **Circle No. A1.**

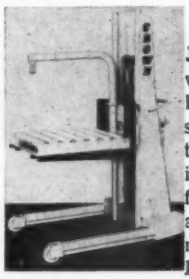
Eliminate Heat Treating Operations and problems using the high-strength steel explained in a bulletin. Fatigue-Proof steel bars are available in hexagon shapes in sizes from ¼" to 1½" and can be used for studs, nuts, and bolts. Get a bulletin from La Salle Steel Co., 1420 150th St., Hammond, Ind., or — **Circle Inform-A-Gram No. A2.**

"Small Parts for Industry," a revised bulletin, covers a variety of zinc alloy die cast and molded thermoplastic products in chart form. Both parts made to



customers' specifications and stock items are described. Get your copy from Gries Reproducer Corp., 400 Beechwood Ave., New Rochelle, N. Y., or — **Circle No. A3.**

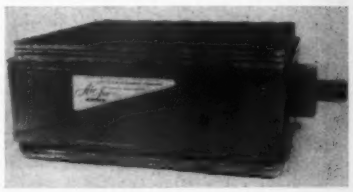
Sintered Tungsten Carbide powders such as Mikrocarbides are used for hard-surfacing, abrasives, diamond settings, oil field tools, and other applications where hard, wear-resistant material is required. Mikrocarbide can be applied by arc, gas, or brazing techniques. Write Shwayder Chemical Metallurgy Corp., 684 E. Woodbridge, Detroit, 26, for information, or — **Circle Inform-A-Gram No. A4.**



Many Lifting Jobs are possible with the Model L-642 portable lift supplied with attachments including adjustable forks, de-mountable boom, and roller top table. Lifting capacity is 2000 lbs. at a 15" load center on the roller top, smooth plate, and forks; and 500 lbs at 15" load center on the boom. Crown Controls Co., Inc., New Bremen, Ohio, or — **No. A5.**

Types of Rubber and Snythetic Parts made on a contract basis are discussed in a bulletin which shows how sponge rubber or synthetics, and sheet and strips are best suited for certain types of parts. Get your bulletin from Mechanical Rubber Products Co., 35 Vail Rd. Warwick, N. Y., or — **Circle A6.**

A Machinery Leveling Mount, for use under machines weighing up to 50,000 lbs, operates on a sliding wedge principle to raise or lower machines. It measures 8" x 8"

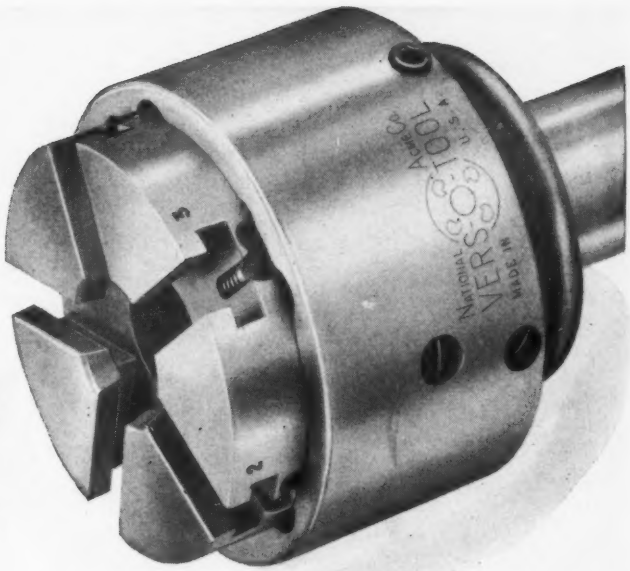


and is usually placed under the four corners of heavy-duty machinery. Clark-Cutler-McDermott Co., Franklin, Mass., or— **Circle A7.**

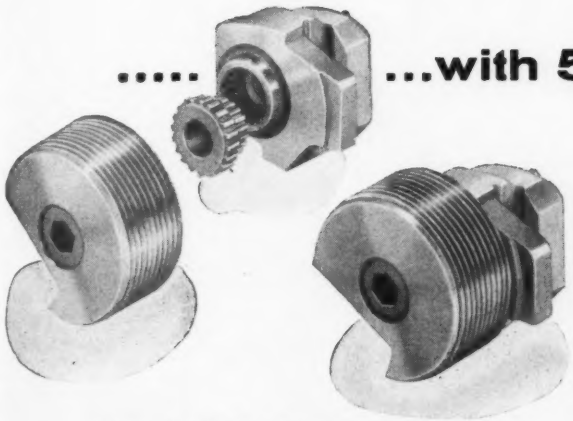
A 5-HP Motor and change in ratio of belt drive serves 12", 18", and 24" extension spindles made by Standard Electrical Tool Co. Each spindle has a universal-type nose to accommodate backing plates for 6", 8", 10", 12", and 14" dia plate-mounted wheels or independent wheel holders. The Standard Electrical Tool Co., Mt. Hope & Sixth Sts., Cincinnati 4, or — **A8.**

"Steel Belt Conveyors Engineering Guide" enables the engineer to design and specify his own steel belt conveyor. Nomographs, tables, line drawings, and graphs simplify the calculation of dimensions. Get a copy from Sandvik Steel, Inc., Fair Lawn, N. J., or — **Circle A9.**

IMPROVE THREAD QUALITY AT COST SAVINGS YOU CAN MEASURE



.....with 5 chaser Vers-O-Tools



Available from stock in sizes from 13/16" to 3 1/2"

The superiority of Vers-O-Tool automatic die heads has been proven in thousands of applications. Basic design simplicity, unsurpassed economies in chaser grinding and precise relocation of chasers without re-adjustment . . . all have contributed to better threaded pieces at lower cost.

Now with 5 chaser heads available in a complete range of sizes . . . *add up these conclusive facts—and prove it to yourself!*

Write for complete information

- Elimination of out of round and drunken threads
- Chasers can be ground closer to center, resulting in smoother, more accurate threads
- 5 Chasers lighten the chip load on each tool
- Longer chaser life per grind—less machine down time
- 5 Chasers permit threading of parts with flats, slots, keyways, etc.

National Acme

THE NATIONAL ACME COMPANY
169 East 131st Street
Cleveland 8, Ohio

Sales Offices: Newark 2, N. J., Chicago 6, Ill., Detroit 27, Mich.

CIRCLE INFORM-A-GRAM KEY NO. 107

DIE SETS on the ROCKS?

It'll never happen if you specify Detroit Die Sets

Detroit DIE SET CORPORATION

You can have a free copy of our 60-page catalog by asking for it. Details over 2000 stock precision and commercial die sets—plus accessories.

2895 WEST GRAND BOULEVARD • DETROIT 2, MICH.

Offices in Principal Industrial Centers

CIRCLE INFORM-A-GRAM KEY NO. 108

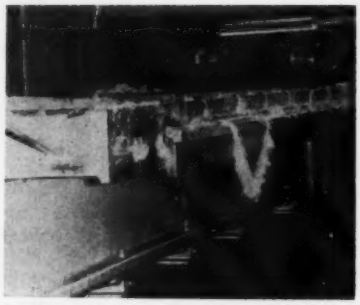
Almost 50 Different Models of timing instruments are discussed and illustrated in a catalog that also explains the coil spring mechanism featured in them. Get Catalog 258 from M. Ducommum Co., 580 5th Ave., New York 19, or — **A10.**

These Flexi-Pak Energy Cartridges are for applications where pins or rivets cannot be used to hold washers together. Flexi-Pak cartridges have Belleville spring

washers held together in this flexible elastic covering. For more information, write Associated Spring Corp., Bristol, Conn., or — **A11.**

An Industrial Grease has been developed for use on bearing applications where high pressures and shock loads exist, or where there is a tendency for corrosion to occur. Use Gulfcrown Grease EP also on cams and gears. Gulf Oil Corp., Pittsburgh, Pa., or — **A12.**

This Precision Leveling Jack for heavy production machinery permits height adjustments by the ad-



justing bolt in seconds. Height is adjustable, from 3¼" to 3¾" and travel of the slide is ½". Hammond Pattern Works, 2130 Violet, Los Angeles, or — **Circle A13.**

A 48-page Reference Manual of steel equipment analyzes all types of steel shelving, drawers, workbenches, tables, and other storage and shop equipment. For your copy of Manual 485, write to Equipto, Aurora, Ill., or — **Circle A14.**

"World's Fastest Wire Cutting and Stripping Machine" is the title of a bulletin which presents information on production rates, tolerances, types of insulated wire handled, and operating features. Jennings Machine Corp., 3452 Ludlow St., Philadelphia 4, or — **A15.**

New Metal-Ceramics are described in a booklet which gives physical, mechanical, and chemical properties, and typical applications of these cermets. Get the booklet from Haynes Stellite Co., 420 Lexington Ave., New York, or — **Circle A16.**

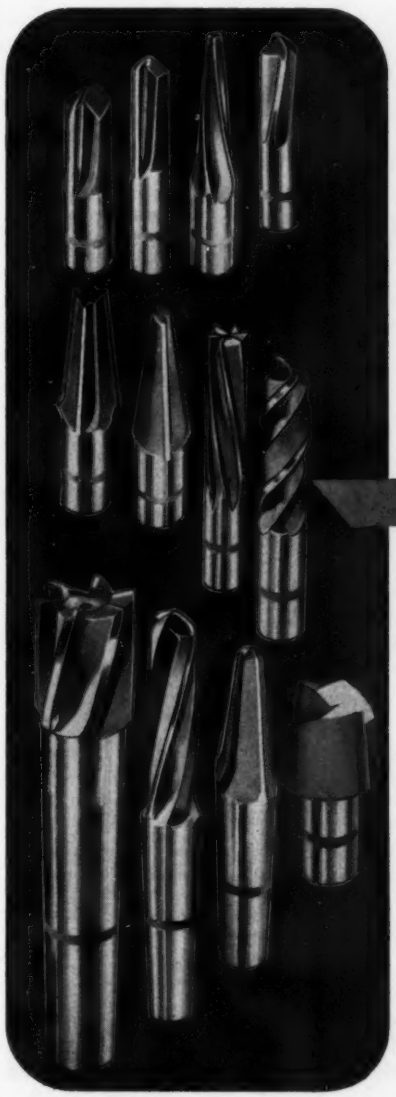
Over 60 Exotic Metallic Compounds are announced in a price list from American Electro Metal Div'n, Firth Sterling, Inc., 320 Yonkers Ave., Yonkers, N. Y. Included are borides, carbides, nitrides, silicides, and intermetallic compounds. Get your copy from the company, or — **Circle Inform-A-Gram No. A17.**

Products & Processes

PRODUCTS & PROCESSES & PRODUCTS

Prevent Galling of Threaded Parts with Ferulube, a lubricant recommended for reducing wench torque in the makeup of bite-type tube fittings. Use on ferrules and threads of fittings can reduce make-up torque as much as 75%. Catalog 1149A4 is available from Parker Fittings & Hose Div'n, Parker-Hannifin Corp., 17325 Euclid Ave., Cleveland 12, or —

Circle Inform-A-Gram No. A18.



T-J CUTTERS

assure higher production precision die sinking!

The facts speak for themselves when more and more metal-working engineers are finding that T-J Cutters assure precision accuracy, and high production die sinking. T-J Cutters are extra sturdy too . . . for longer life . . . reduced die costs . . . more profits for you.

Specially designed and precision manufactured for speed, accuracy and long life, T-J's complete cutter line means less breakage . . . more work between grinds. Made from the finest tool steels available . . . properly machined . . . scientifically heat-treated and accurately ground. Send for catalog No. 1057 for information of T-J's wide range of styles and sizes. The Tomkins-Johnson Co., Jackson, Mich.

We Invite Your Inquiries on Special Cutters Too!

T-J TOMKINS-JOHNSON

CIRCLE INFORM-A-GRAM KEY NO. 109

Products & Processes

PRODUCTS & PROCESSES & PRODUCTS

The Cadet Footswitch, designed to operate from any angle, gives better control even at the slightest pressure. Made of heavy steel, the switch is rugged and long wearing despite its easy operation. Linemaster Switch Corp., 432 Woodstock Terrace, Woodstock, Conn., or — **Circle Inform-A-Gram No. A19.**

Applications of dispersed colloidal graphite to lubricate conveyor equipment and serve as a tracer on electrical systems are covered in the new Acheson 'dag' disperser bulletin. Descriptions and illustrations are given for three applications. Acheson Colloids Co., Port Huron, Mich., or — **No. A20.**

A Strong, Large Capacity Lifter is the new Type D, Mark II Shoplifter. It handles 750 lbs anywhere on the 24" sq steel platform. For more information, write Economy Engineering Co., 4509 W. Lake St. Chicago 24, or — **Circle No. A21.**

Small Parts for precision instruments, which can be produced to thousandths of an inch accuracy, are described in a brochure. Screw machine gears, pinions, and hairsprings, are among the items discussed. Write to Sphinx-American Co., 32-30 58th St., Woodside 77, Long Island, N. Y., for a bulletin, or — **Circle No. A22.**

The Rapid-Wheel Gravity Conveyor is completely detailed in a 16-page catalog. Applications, specifications, construction features, and accessories are pictured and explained. Contact Rapids-Standard Co., Inc., 342 Rapistan Bldg., Grand Rapids 2, Mich., for Bulletin RW-58, or — **Circle Inform-A-Gram No. A23.**

"Heavy-Duty Coil Springs," a 48-page handbook, presents mathematical data and charts to help users develop springs to meet exact specifications. Types of springs available are also discussed. Get your copy by writing Crucible Steel Co. of America, Spring Div'n, Box 2518, Pittsburgh 30, or — **A24.**

Advantages of producing many special-shaped headed and threaded parts by the cold forge and roll-thread method are outlined in a bulletin. Types of items handled by this process are pictured. For a bulletin, direct requests to The Atlas Bolt and Screw Co., 1234 Ivanhoe Rd., Cleveland 10, or — **A25.**

"Handbook of Cold Drawn, Buttweld Mechanical Steel Tubing" describes the manufacture, uses, and economics of the buttweld product. Metallurgical, mechanical, and engineering data is included in the 60-page handbook, available from Pittsburgh Tube Co., 212 Wood St., Pittsburgh 22, or — **Circle No. A26.**

Unique *Buck* GEAR Chuck

Holds wide range of diameters within .0005" on pitch line

(LOGAN Lathe in Photo)

Commander Mfg. CO. gets remarkable results

Commander, of Chicago, used to need 4 operations to process this gear; Hone I.D. of hob gear, grind O.D. of gear on arbor, press in oilite, use pot chuck on O.D. to bore oilite to .0004" tolerance.

The Buck gear chuck eliminated operations 1 and 2, speeded up 4 by 40%. Tolerance was held, scrap entirely ended. The former problem of runout from pitch diam. to I.D. was licked—it is now held to .001" with production of 70 to 85 pieces per hour.

Brings new flexibility, new low cost to gear I.D. boring and grinding

You see here the *only* chuck that gives you broad capacity in holding gears of different diameters—and holds them *within .0005" precision* on the pitch line. It's a combination of the Buck DUST-PROOF chuck and its master jaws (with full center hole capacity) plus angulate jaws to fit gear teeth. As with every Buck chuck development it is logical, it is simple, *it works,* and the cost is but little more than the standard Buck chucks.

Send for complete details. See why, more than ever, *"It pays to chuck with Buck."*

The Buck line includes Scroll, Dust-Proof, Power, Independent chucks, Boring Bars.

BUCK TOOL COMPANY

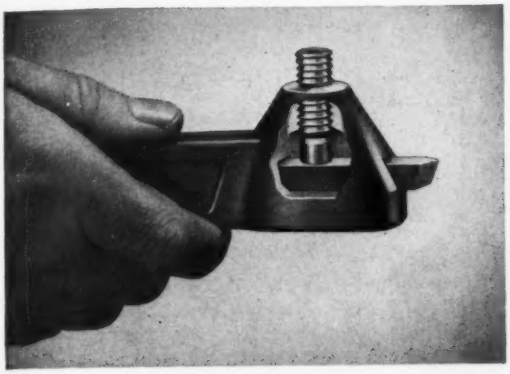
1018 SCHIPPERS LANE • KALAMAZOO, MICH.

CIRCLE INFORM-A-GRAM KEY NO. 110

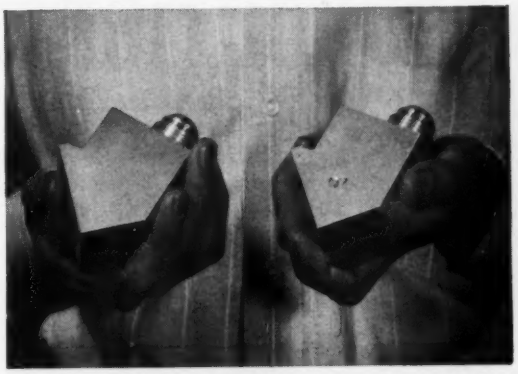
Practical Tooling Tips

Number 1 of a series.

Everyday more and more shops are using standard Vlier Tooling Accessories in place of custom-made devices for both tooling and original equipment applications. The precision construction, product uniformity and quick availability of these simple time-savers have made them tool room favorites. Why don't you start saving from their use?

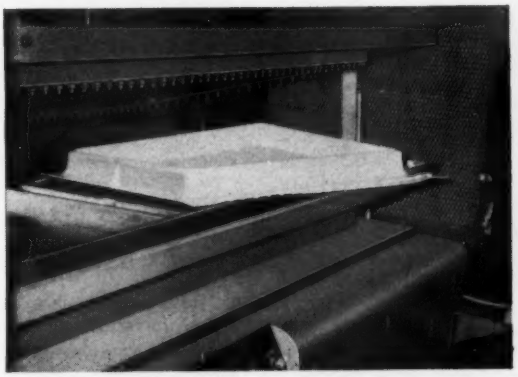


TO GET GREATER TOOL BIT RIGIDITY replace the tool holder screw with a Vlier Swivel-Pad® Clamp. The large, flat pad face provides many times more clamping area. Bits can be held tighter, reducing chatter and vibration. Small, narrow cut-off blades, multipoint tools, even stub ends can be rigidly held. Unique ball joint construction gives smooth angle adjustment in all directions.



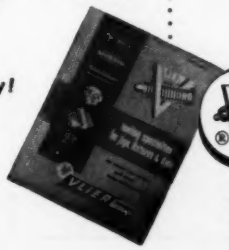
EASY WAY TO STOP MARRING surface of part held in fixture. The part on the left was securely held in the fixture with a Vlier Swivel-Pad® Clamp. The scrapped part on the right was held with an ordinary set screw. With the Vlier Swivel-Pad® Clamp the pad stops at first contact with the part; screw torque is absorbed by a ball, preventing damage to the part. This exclusive ball joint construction also provides adjustment to off-angle surfaces.

SPRING PLUNGERS LET WRENCH DO MULTIPLE DUTY—The compression tool shown above is used to attach connectors to electrical wires. Formerly, each size wire connector required a different size tool. But now, through the use of Vlier Spring Plungers, one tool attaches all sizes of connectors—through the use of changeable jaws. The appropriate jaw for any size connector is easily inserted, accurately positioned, and held in place with a Vlier Spring Plunger.



THE RIGHT AMOUNT OF END PRESSURE AND NO MORE is what this spring plunger application calls for. More than 150 Vlier Spring Plungers are used to hold a plastic sheet in position during the forming operation of a plastic refrigerator door liner. Spring Plungers provide just the right amount of pressure to produce a perfect liner.

New catalog now ready! Send for your copy today.



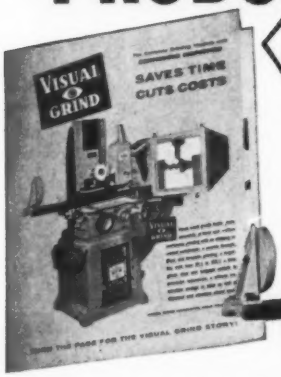
Insist on Vlier Tooling Specialties... there's still no substitute for quality.

VLIER ENGINEERING CORPORATION

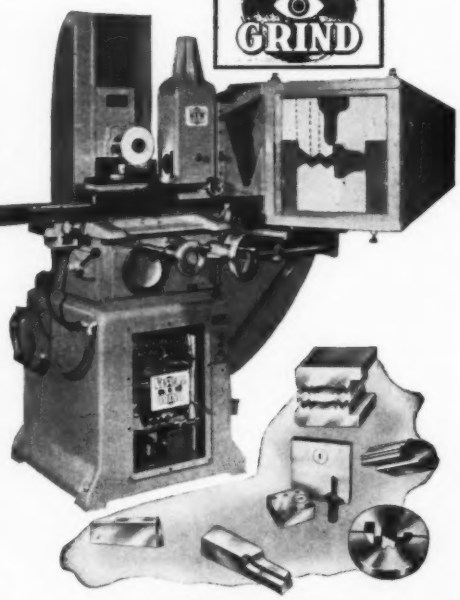
8900 Santa Monica Blvd., Los Angeles 46, California
A Subsidiary of Barry Controls, Inc.

CIRCLE INFORM-A-GRAM KEY NO.111

FREE BROCHURE TELLS HOW YOU CAN GRIND PRECISION HIGH PRODUCTION DIES



VISUAL GRIND



IMPORTANT TO YOU!

Free booklet tells how VISUAL GRIND facilitates construction of precision high-production dies, dies for powder metallurgy, lamination dies and special purpose dies. VISUAL GRIND permits through, blind and templet grinding . . . permits continuous inspection by magnifying work from 10:1 to 100:1 . . . upgrades semi-skilled labor . . . permits easy maintenance of dies in your own plant . . . reduces costly down time. VISUAL GRIND COMPLETES YOUR TOOL ROOM.

Visual Grind solves the problem in mind

Intricate grinding jobs like those shown above ordinarily involve several machines. ALL WERE FORM GROUND ON A SINGLE VISUAL GRIND.

CLIP and MAIL THIS COUPON TODAY

The CLEVELAND GRINDING MACHINE Co.
1730 EDDY ROAD CLEVELAND 12, OHIO

Please send me the free brochure describing the capabilities of the VISUAL GRIND.

Name ..... Title .....

Company .....

Address .....

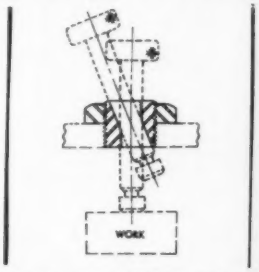
City ..... State .....

CIRCLE INFORM-A-GRAM KEY NO. 112

Toolroom

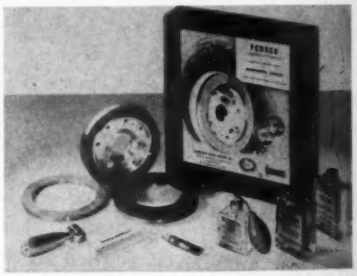
PRODUCTS & PROCESSES & PRODUCTS

Quick-Acting Inserts for clamping have been announced by Northwestern Tools, Inc., 116 Hollier Ave., Dayton 3, Ohio. They can be installed easily on new and old fixtures simply by drilling and tapping a hole at the desired location. A jam nut or set screw can be used to lock the insert into position. For information, write the company, or — **Circle Inform-A-Gram No. A27.**



"Strenes Metal," discusses applications for this chromium-molybdenum alloyed gray iron, such as for producing punches and dies for drawing, forming, rolling, and straightening operations, as well as for jigs and fixtures. Engineering data and specifications are included in Bulletin 13, available from The Advance Foundry Co., 107 Seminary Ave., Dayton 3, Ohio, or — **Circle Inform-A-Gram No. A28.**

An Economical Tool Kit contains a demountable precision diamond wheel and magnetic chuck, plus all the accessories for quickly and easily finish grinding carbide cutting tools. The diamond grinding rings are adaptable to all 6" carbide tool grinders. Get details from Penn Scientific Products Co., Abington, Pa., or — **Circle No. A29.**



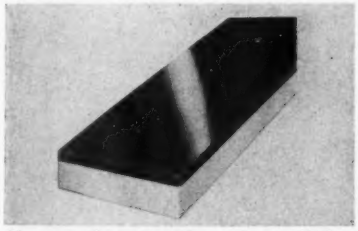
Routing, Duplicating, and Grinding can be accomplished on the Pruitt Profiler P-500 with patented guide button. This button, connected to the micrometer dial, provides accurate settings to 0.0005". Precise speed adjustment from 100 to 45,000 rpm is possible. Tool-Lab, Inc., 836 N. Broadway, Escondido, Calif., publishes literature, or — **A30.**

Stress-Less Steel Stamps with round faces, introduced by M. E. Cunningham Co., 1068 Chateau St., Pittsburgh 33, are used in marking

parts subjected to vibration, where stresses from sharp-faced markings are common. Eleven sizes from 1/16" to ½" are available. For details, write the company, or — **A31.**

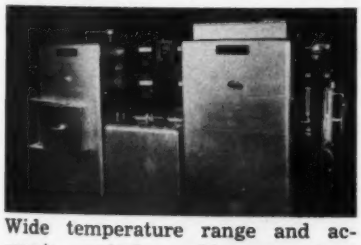
Improved Wear Resistance is a feature of Latrobe's new flat ground oil hardening steel, ground 0.014 to 0.016 oversize on thickness dimension. Badger is used for blanking dies, punches, cold forming dies, gages, jigs, and machine parts. For information, write Latrobe Steel Co., Latrobe, Pa., or — **Circle Inform-A-Gram No. A32.**

Extra-Long Wearing Properties of O-Kni-Co aluminum bronze clad wear plates is provided by the increased thickness of aluminum bronze from 3/16" to ¼". They can be used as slides in cam and trim



dies or wherever there is a sliding action between flat metal parts. The Ohio Knife Co., Dept. LL-80, Cincinnati 23, Ohio, or — **A33.**

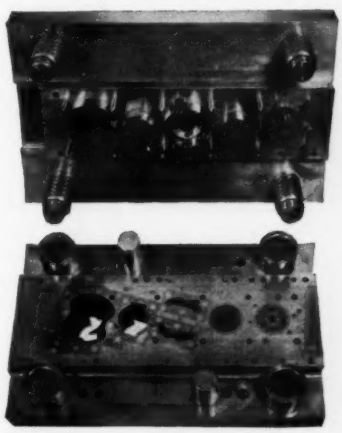
For Heat Treating Small Tools, use the improved furnaces announced by Waltz Furnace Co., Dept. U, 1901 Symmes St., Cincinnati 6.

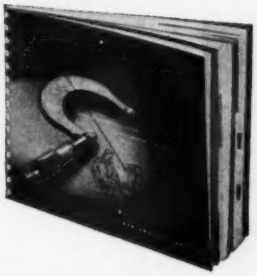


Wide temperature range and accurate controls enable every type of high speed steel, including cobalt type, to be heat treated. Get details from the company, or — **Circle Inform-A-Gram No. A34.**

DO YOU REQUIRE PRECISION HIGH-PRODUCTION DIES?

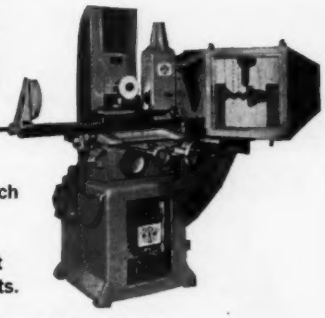
CLEVELAND TOOL and DIE COMPANY SOLVES YOUR PROBLEMS and meets your most exacting tool and die requirements. Cleveland Tool and Die Company has built individual dies which have produced millions of precision tolerance pieces without retooling. SEND FOR THIS FREE BROCHURE DESCRIBING OUR FACILITIES.





FREE Brochure
Describes Facilities
available. Send for your free copy today. No obligation, of course.

Typical lamination die custom-made at Cleveland Tool and Die Company. Dies like this, dies for powder metallurgy and other special purpose dies are made by skilled craftsmen using the most modern techniques and facilities.



Typical of the modern facilities employed is VISUAL GRIND, which permits contour grinding of your dies without stopping to consult a comparator. Eliminates stop and start grinding, saves time, cuts die costs.

CLIP and MAIL THIS COUPON TODAY

CLEVELAND TOOL and DIE Co.
1730 EDDY ROAD CLEVELAND 12, OHIO

Please send me the free brochure describing the facilities of CLEVELAND TOOL & DIE COMPANY.

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Company .....

Address .....

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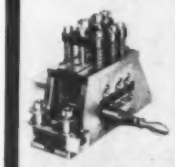
CIRCLE INFORM-A-GRAM KEY NO. 113

Buy DURANT

PRESS ROOM EQUIPMENT

STANDARD STOCK STRAIGHTENERS
Made in nine standard sizes to meet most requirements. Widths from 2" to 8"; roll combinations range from 5 to 9. Special sizes available to specific requirements.



RAM SCRAP CHOPPER
Low cost, operated by press ram, independent of die. Easily bolted to press.

FOUR MODELS
M1 takes stock 3" wide .062 thick
M2 takes stock 6" wide .062 thick
M3 takes stock 10" wide .100 thick
M4 takes stock 12" wide .100 thick

AUTOMATIC STOCK REEL
Operates by natural spring of uncoiling stock. Platen turns on ball bearings. No motor, belts or sprockets. Loop of stock stops slippage, kick back, and over run. Speed limits controlled only by feed.

Write Now for new catalog showing prices and complete line of Equipment.

DURANT Tool Supply Co.
1-15 THURBERS AVENUE
PROVIDENCE 5, RHODE ISLAND

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PRODUCTIVE

PRODUCTO FOOT PRESSES

These sturdily constructed, bench-type presses are ideal for novelty and small stamping or assembly operations. Available in two sizes, both with high output to input ratio. Write for detailed specification sheets.

THE PRODUCTO MACHINE CO.
970 Housatonic Ave.
Bridgeport 1, Connecticut

CIRCLE INFORM-A-GRAM KEY NO. 1142

Grinding & Finishing

PRODUCTS & PROCESSES & PRODUCTS & PROCESSES & PRODUCTS & PROCESSES & PRODUCTS

Speed Production Grinding using the Selectron automatic chuck control and Power-Grip magnetic chuck. They provide variable holding power and a "demag" cycle

that eliminates all residual magnetism, so even thin and fragile workpieces may be removed from the chuck easily without distortion. The DoAll Co., Des Plaines, Ill., or — **Circle Inform-A-Gram No. A35.**

A Versatile Grinder-Polisher Combination is the Hammond Model ND-12 no-dust grinder with the U-2 abrasive belt attachment. This attachment is available for right- or left-hand mounting and will handle belts from 72" to 90" long and 1" to 2½" wide. Hammond Machinery Builders, Inc., 1631 Douglas Ave., Kalamazoo, Mich., or — **A36.**

The Mini-Tumbler, designed by Rampe Mfg. Co. for portable use for tumbling-finishing small parts, features a 24-52 rpm variable speed drive for added flexibility. The one-gal capacity portable model

can be used for continuous-duty finishing work, screw machine work, in instrument shops, etc. For information, write Rampe Mfg. Co., 14915 Woodworth Ave., Cleveland 10, or — **Circle No. A37.**

Filing, Trimming, and deburring a wide variety of small components like stampings, castings, and die castings can be handled by the Rindis power filing machine. It removes material four to six times faster than hand filing without using expensive abrasives. Newage Industries, Inc., 222A York Rd., Jenkintown, Pa., supplies literature or — **Circle A38.**

Grind Inside Surfaces where clearance is a major factor, and handle small jobs, with this abrasive belt unit. Model TS-90 uses a 90" belt in 1" or 2" widths for removal of flash or parting lines on non-ferrous castings, or for sharpening special shape dies. Grinding & Polishing Machinery Corp., 2530 Winthrop Ave., Indianapolis 5, or — **Circle A39.**

"Abrasive Cutting Center" is a booklet which describes the new demonstration laboratory of The Allison-Campbell Div'n, American Chain & Cable Co., Inc., 929 Connecticut Ave., Bridgeport 2, Conn. Bulletin DH-20 is available from the company, or — **A40.**

Controlled Electromagnetic Vibration is the technique employed by the LP-4 Syntron vibratory lapping machine. Fast lapping of up to 35" dia and larger than 75-lb metal parts is possible. The combined

vertical and radial movement of the parts over the abrasive cloth is a result of this vibration. Syntron Co., 341 Lexington Ave., Homer City, Pa., or — **Circle A41.**

This Portable Dust Collecting System is a self-contained unit which fits any 55-gal open-end steel drum for wet or dry pick-up. Model 100 Dust-Master is of the cyclone-separator-type with heavy-duty construction. The Cincinnati Fan & Ventilator Co., 3548 Montgomery Rd., Cincinnati 7, or — **Circle Inform-A-Gram No. A42.**

This valve gets a leak-proof seal from a Blanchard Surface Grinder

"The Blanchard Surface Grinder is one of the most important improvements in our modernization program." This report comes from the Commercial Refrigeration Division of Bendix-Westinghouse Automotive Air Brake Company—makers of power and condensing units for refrigeration equipment.

The Blanchard No. 18 Surface Grinder puts a surface of 5 micro inches or better on Bendix-Westinghouse valves at the rate of 75 pieces an hour.

A Blanchard Model 18 Surface Grinder is used to finish grind valve plates used in Bendix-Westinghouse electric refrigeration compressors. They say: "This operation is very important, because—with a surface finish of five micro inches or better—we get a perfect seal on our gaskets and valves, eliminating the possibility of leakage."

Is there room for improvement in *your* surface grinding? For best results...

Write today for your free copy of "Work done on the Blanchard," fifth edition, and "The Art of Blanchard Surface Grinding," fourth edition.

PUT IT ON THE BLANCHARD

THE BLANCHARD MACHINE COMPANY

64 STATE ST., CAMBRIDGE 39, MASS., U. S. A.

CIRCLE INFORM-A-GRAM KEY NO. 115

Grinding & Finishing

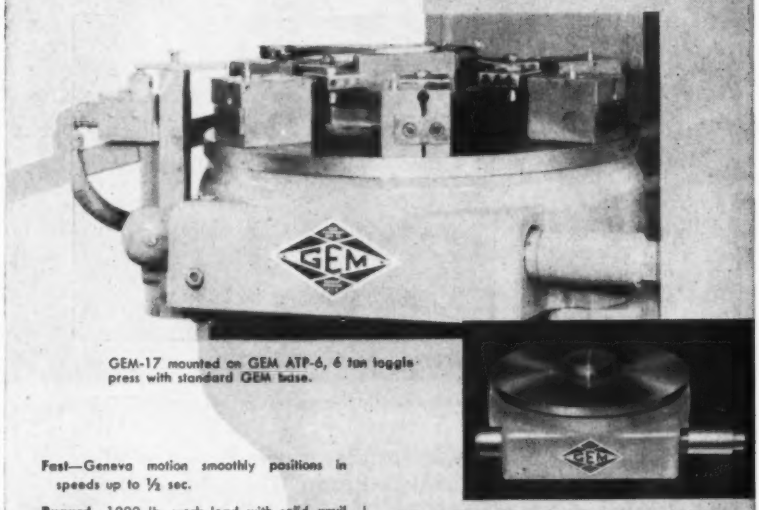
PRODUCTS & PROCESSES & PRODUCTS

"Oriented Vector Diamond Tools" for wheel dressing and trueing is a bulletin which describes advantages of these new diamond tools. They can be used entirely without turning or resetting and dress and true evenly. One tool is used for large and small wheels of coarse and fine grits. Get bulletin from Golconda Sales Corp., 3418 N. Knox Ave., Chicago, or — **Circle A43.**

"Metallic and Resinoid Bonded Diacraft Diamond Grinding Wheels" are highlighted in a 28-page catalog. Descriptions of these wheels made in all standard and custom made shapes and sizes for carbide grinding and special applications, are included. Get your copy from Diacraft, Inc., 26538 W. 7 Mile Rd., Detroit 40, or — **Circle A44.**

precision indexing to ±0.001"

. . . WITH GEM-17 DIAL INDEX TABLE



GEM-17 mounted on GEM ATP-6, 6 ton toggle press with standard GEM base.

Fast—Geneva motion smoothly positions in speeds up to ½ sec.

Rugged—1000 lb. work load with solid anvil capacity of 30 tons.

Positive lock—Bolt in Geneva slot cammed both in and out given positive locking.

Power—Comes complete with rotary air motor, solenoid valve with limit switch (fluid or electric motors available).

Number of stations—6, 8 or 12 standard, 3 and 4 skip.

Size and weight—200 lbs. complete with 17" dia. table (plates up to 36" available).

Geneva Motion GEM-17 Indexing Table standardizes automation on your assembly and machining operations . . . drilling, tapping, riveting, spinning, staking, knurling, chamfering, welding, screwdriving, stud driving and gaging to the speed and accuracy required. Gray's complete engineering staff can adapt the table to your work problem.

Send for Bulletin DI-17 and complete information.

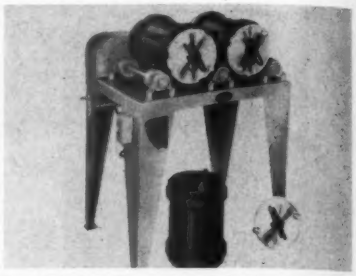
gem **GRAY equipment company**

automatic assembly equipment

13600 Ford Road • Dearborn, Mich. • Telephone: TUbay 6-7572

CIRCLE INFORM-A-GRAM KEY NO. 116

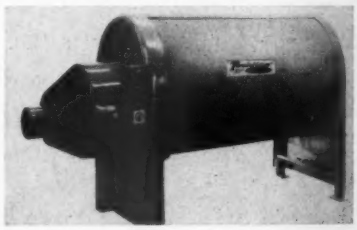
Deburring, Descaling, Polishing, radiusing, grinding, and burnishing are operations performed by the barrel finishing machine introduced



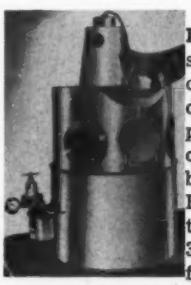
by Globe Barrel Finishing Equipment Div'n, Casalbi Co., 540 Wayne St., Jackson, Mich. One-piece construction eliminates contamination by particles lodged in crevices. Get details from the company, or — **Circle Inform-A-Gram No. A45.**

"Job-Engineered" Buffing and polishing machinery is described in a new brochure. Descriptions are included for a circuit conveyor, an abrasive belt head, and single-stage automatic buffing machine. Write Divine Bros. Co., Seward Ave., Ithaca, N. Y., for this bulletin, or – **Circle Inform-A-Gram No. A46.**

Vibration-Free Operation is a feature of this new line of precision barrel finishing equipment manufactured by the Techline Div'n, Wheelabrator Corp., Vicksburg, Mich. Model 30 Series offers 20



models ranging from 5 to 30 cu ft capacities, with one to six separate compartments. Get information from the company, or — **A47.**

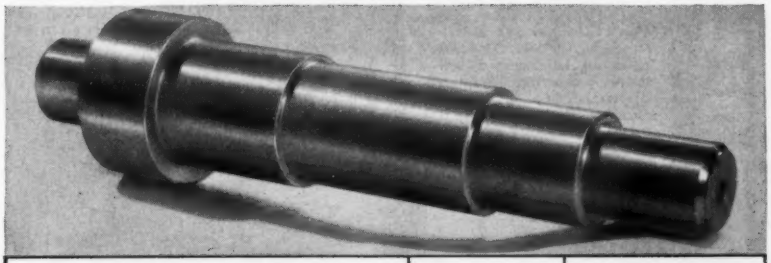


A Wet Blast Honer saves resharpening time, cuts machine downtime, and produces high quality finish deburring. Liqui-Breez increases tool life by about 300% and is used for honing all types of tungsten-carbide and high speed steel cutting tools and drills. Tobin-Arp Mfg. Co., 6400 Penn Ave. South, Minneapolis 23, or — **Circle Inform-A-Gram No. A48.**

Production time reduced 82% on new lathe

PROFIT POINT TURNING

New Barber-Colman 36-speed lathe does 13 operations on drive gear and shaft in 22.7 minutes



Turning time on the drive gear and shaft shown in the illustration was reduced from 126 minutes to 22.7 minutes when transferred from an old lathe to a new Barber-Colman 36-speed lathe.

The shaft is 15″ in length with a maximum diameter of 3.744″. Spindle speeds range from 644 rpm to 912 rpm, and the feed is .013″ per revolution. On the old lathe, speed was 350 rpm and the feed was .015″ per revolution. This is a good example of how machine horsepower, accuracy, rigidity, and operational features can reduce costs drastically.

Easy-to-set up Barber-Colman lathes combine power and precision for profitable optimum speed turning with negative-rake throwaway insert tools. They're heavier and wider through the carriage than most lathes of their size. Controls are "human engineered" to make a busy operator's job easier and more efficient. Yet they offer every toolroom feature you can name, plus guaranteed accuracy for precision work.

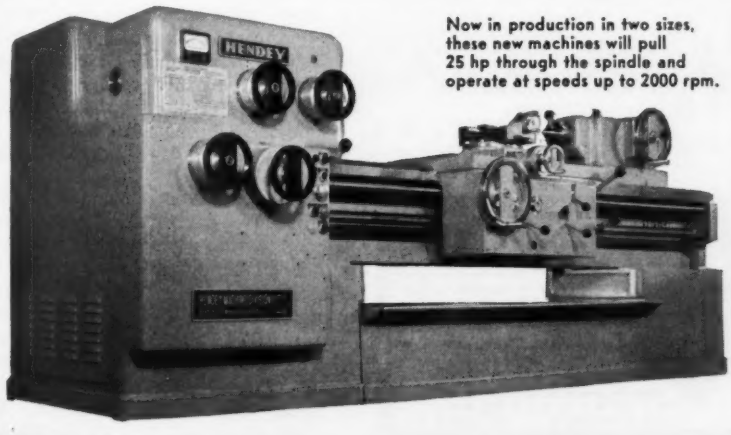
STANDARD TIME	OLD LATHE	NEW 36-SPEED LATHE
SETUP TIME (hours)	1.09	1.75
SPEEDS (rpm) FEED (inches per rev.)	350 .015	644 to 912 .013
PRODUCTION (per hour)	0.47	2.64

Opportunities in cost-cutting modernization

There'll never be a better time to buy a new lathe, or greater opportunities to reduce costs through equipment modernization. Here are two good reasons:

1. *Throwaway insert tools* are the biggest "break-through" in lathe "economics" in 30 years. Think of what it costs you to sharpen, change, and reset conventional tooling! Throwaway inserts make your perishable tool costs so low in relation to part costs and the cost of operating a machine, the only sensible thing to do is boost speeds, burn up tools faster, and reduce floor-to-floor time.

2. *It's the right time to buy machine tools,* because you can "pick and choose" — get the right machine and tooling for your assortment of jobs. The increase in productivity will prepare your plant for periods of high volume, spiraling costs, and labor shortages tomorrow.



Now in production in two sizes, these new machines will pull 25 hp through the spindle and operate at speeds up to 2000 rpm.

Barber-Colman Company
107 Loomis Street, Rockford, Illinois

Don't expect a day's work for a day's pay on yesterday's machine tools.

BARBER COLMAN®

PRECISION LATHES

CIRCLE INFORM-A-GRAM KEY NO.117

BENTLEY

Here is the most priceworthy quality milling machine...the NEW VICTORIA U2 RAPIDMIL

by ELLIOTT of LONDON

Larger Working Surface: 48" x 11¾" ● *Longer Travels:* 30" L., 10" X. & 16" V. ● *Faster Operation:* RAPID Traverses in all directions ● *Complete Safeguards:* Overload Feed Clutches etc. ● *Up-to-date Construction:* Built-in Backlash Eliminator, 4-Bearing (Timken) Spindle etc. ● *Wider Ranges:* Feeds: .65"-21.5" min., Speeds: 30-1500 RPM (2 ranges)

Vertical, plain and universal models available from #0 to #4

Delivery from stock and Complete Service Available

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CIRCLE INFORM-A-GRAM KEY NO. 1181

Now ANGLE TANGENT TO RADIUS WHEEL DRESSING WITH NEW VERSATILE TOOLS

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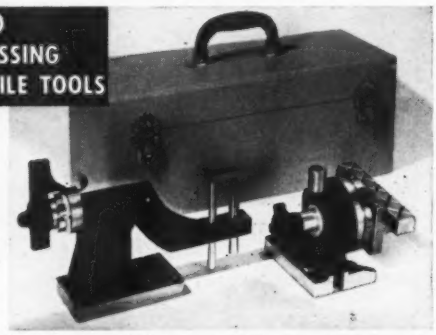
The G-5 RADIUS DRESSER is a precision engineered tool that will dress either a convex or a concave radius from .015" to 1.750" on a 7 inch or 10 inch wheel, and it may be set to the exact radii desired. Graduated stops allow you to dress any desired portion of a radius. The spring tension journal insures chatter free operation. The G-2 ANGLE DRESSER AND TOOL HOLDER is actually two tools in one, having an easy to read vernier scale 0° to 180° giving accuracy within 2" of 1°; an excellent time saver to set up small jobs to be milled, drilled, tapped, etc., on any desired angle.



Our fixtures will dress most radii and angles tangent to each other, similar to those shown below.

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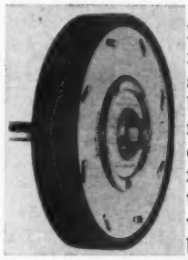
CIRCLE INFORM-A-GRAM KEY NO. 1183

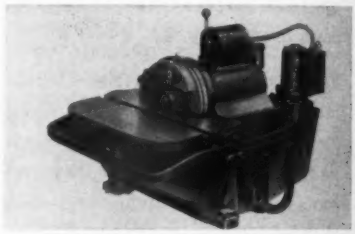
Grinding & Finishing
PRODUCTS & PROCESSES & PRODUCTS



A New Type Expanding Wheel for circular abrasive belts is self-balancing and maintains a flat edge to be used for polishing and tool grinding as well as rough deburring. Two versions are available for different speeds. Miller Products Co., 1438 12th St., Box 325, N. Chicago, or — **Circle Inform-A-Gram No. A49.**

Ninety-Nine Typical Honing Applications are given briefly in a catalog which shows typical honed parts of various materials; parts with lands, slots, and ports; small diameter parts; and parts with splines and keyways. Dimensions are given in this 15-page catalog, now available from Sunnen Products Co., 7910 Manchester Ave., St. Louis 17, or — **Circle A50.**

Automatic Oscillating Motion of the head of this grinding and lapping machine eliminates operator fatigue and produces a straight edge



at whatever rake is required. Model GF-O provides lapping for both right- and left-hand tools. The Wickman Mfg. Co. 10325 Capital Ave., Detroit 37, or — **Circle No. A51.**

Lorco Barrel Finishing Equipment is highlighted in a bulletin which gives information on conventional horizontal octagonal barrels and accessory equipment. Dimensions and explanations are included for all items. Get Bulletin 158 from Lord Chemical Corp., 2068 S. Queen St., York, Pa., or — **Circle No. A52.**

An Improved Chemical Coolant from Texaco provides rust protection, settles grinding dirt rapidly, doesn't have unpleasant odors, and leaves no sticky film on machine surfaces. Use Cooltex in grinding operations and other machining where cooling rather than lubrication is the main requirement. The Texas Co., 135 E. 42nd St., New York 17, or — **Circle No. A53.**

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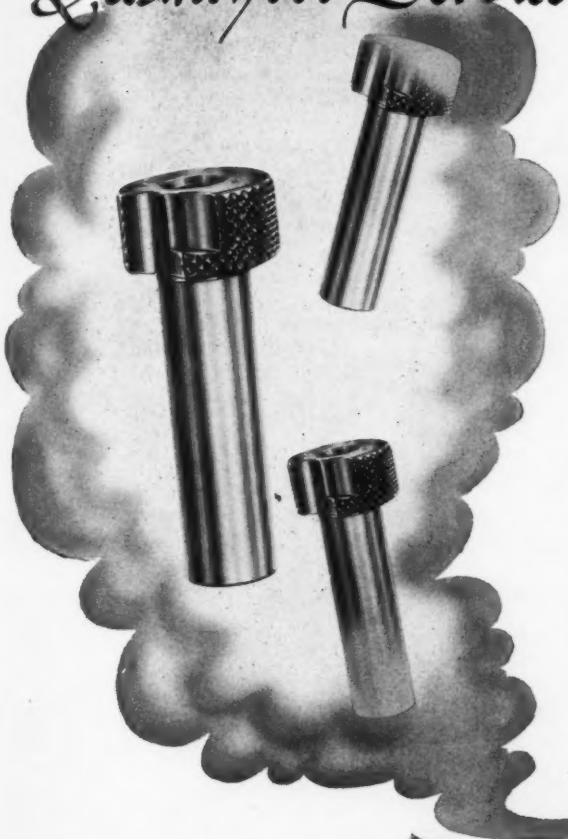

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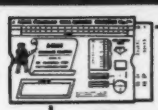

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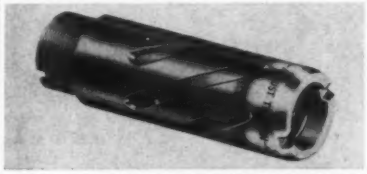
Machining

PRODUCTS & PROCESSES & PRODUCTS & PROCESSES & PRODUCTS & PROCESSES & PRODUCTS

Prevent Loss of Tension in master pushers using Benco adjustable pushers. A new method combines the centrifugal force and the spring



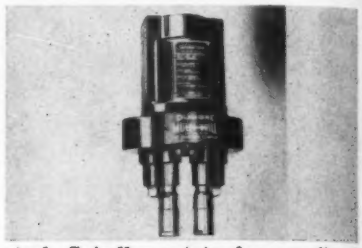
action to reduce downtime, improve machine performance, and produce better quality products. Benco Collet Mfg. Co., Cleveland 14, Ohio, or — **Circle Inform-A-Gram No. A54.**

A Machining Chart gives tool designs for machining mechanite metal. Recommended practice while using carbide tools, tool life graphs, and hints for preparation and sharpening of tools are given. Write to Meehanite Metal Corp., 714 North Ave., New Rochelle, N. Y., for this chart, or — **Circle No. A55.**

Use Straight-Type Roller Bearing Bushings in the outer support of horizontal milling machines for limited diameter requirements.

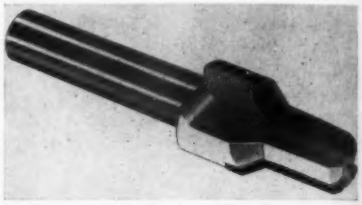
They increase cutter life and hold precision at greatly increased feeds and speeds. Donley Products, Inc., 11106 Avon Ave., Cleveland 5, or — **Circle Inform-A-Gram No. A56.**

Increase Drilling and Tapping production with the multiple spindle drilling and tapping attachment, Multi-Drill. Each spindle has a drilling capacity up to ¼" in



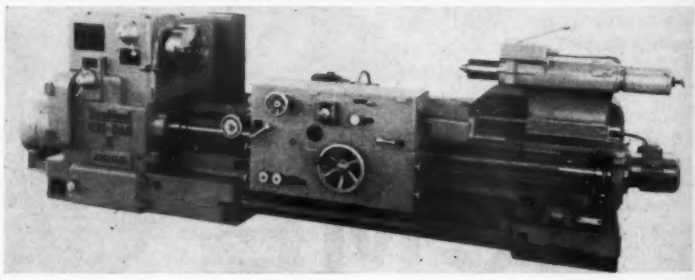
steel. Spindles rotate from a fixed point and can be adjusted from ⅞" center distance to 3⅞" maximum bolt circle. The Dumore Co., 1300 17th St., Racine, Wis., or — **A57.**

These Carbide-Tipped Tapered Pipe Reamers, used as standard tools, prevent excessive tap wear



and tap breakage. They're available in ⅛" to 3" dia from Wetmore Tool & Engineering Co., 5320 E. Washington Blvd., Los Angeles, or — **Circle Inform-A-Gram No. A58.**

Motorized Spindles from ½" hp to 10 hp are listed in a catalog which illustrates various types and also describes belt driven spindles, feeds, slides, and a line of accessories. Catalog S-58 is available from The Cincinnati Electrical Tool Co., 360 Mt. Hope Ave., Cincinnati 4, or — **Inform-A-Gram No. A59.**



For Threading Operations, use the Cri-Dan high speed semi-automatic single-point threading machines now available in the U. S. from Gisholt Machine Corp. They are cam-controlled and provide accurate lead and thread form on all types of internal and external threads. They're capable of 80 passes/min.
Circle Inform-A-Gram No. A60.

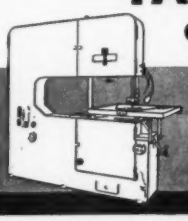
FRICTION SAWING with Tannewitz HIGH SPEED BAND SAWS

FASTEST, BEST MEANS OF CUTTING METALS

If you are not familiar with the advantages of friction sawing with these machines, by all means drop us a line asking for "Friction Sawing Data." You can save many times the cost of a Tannewitz High Speed Band Saw and greatly expedite production by using it to cut sheets of both hard and soft steel, formed or flat, trimming malleable and steel castings, cutting armor plate or many other materials. Write NOW!

THE TANNEWITZ WORKS

GRAND RAPIDS, MICHIGAN ☎ **GL-6-1729**



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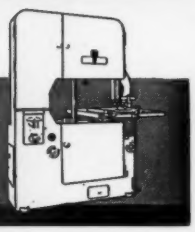
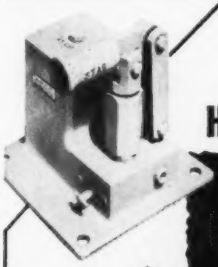
The smoothest, fastest, most trouble-free Di-Saws on the market. Write for bulletin.



CIRCLE INFORM-A-GRAM KEY NO. 1211



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SINGLE PISTON
HYDRAULIC PUMP

LOOK INSIDE— SEE WHAT YOU'RE BUYING

- Spring loaded multiple chevron piston packings for lifelong service.
- All pistons chromium-plated to guard against abrasions.
- SAFETY BY-PASS VALVE to prevent overload dangers.
- Gauge opening.
- 60 cu. in. reservoir or smaller or larger to specifications.
- ½", ¾" or 1" pistons with 1½" stroke.
- 24" or 30" levers, as desired.

Ask for catalog #555. Special engineering counsel cheerfully submitted on request.

Representative areas available.

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PLANT: RIVER GROVE, ILLINOIS

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low cost HYDRAULIC KEYSEATER

cuts standard, tapered keyways ¼" to 2" wide

- fast set-up—saves time and money
- low cost operation-uses standard tool bits
- heavy-duty hydraulic circuit—assures accurate keyways
- compact, 21" x 61"—no special foundation

Send for Bulletin 34

E. W. BLISS COMPANY
1132 N. Seventh St., San Jose, Calif.

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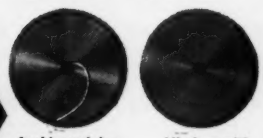
NOW GET CLEAN SURFACED PARTS FROM YOUR AUTOMATICS . . . *UNMARRED* BY TOOL WITHDRAWAL MARKS

THE NEW RELIEVOMATIC SELF-RELIEVING TOOL HOLDER

SAVES YOU COSTLY SECONDARY FINISHING OPERATIONS



Avoid scratches like this — All clear with "Relievomatic!"

Easily installed on cross-slide or turret

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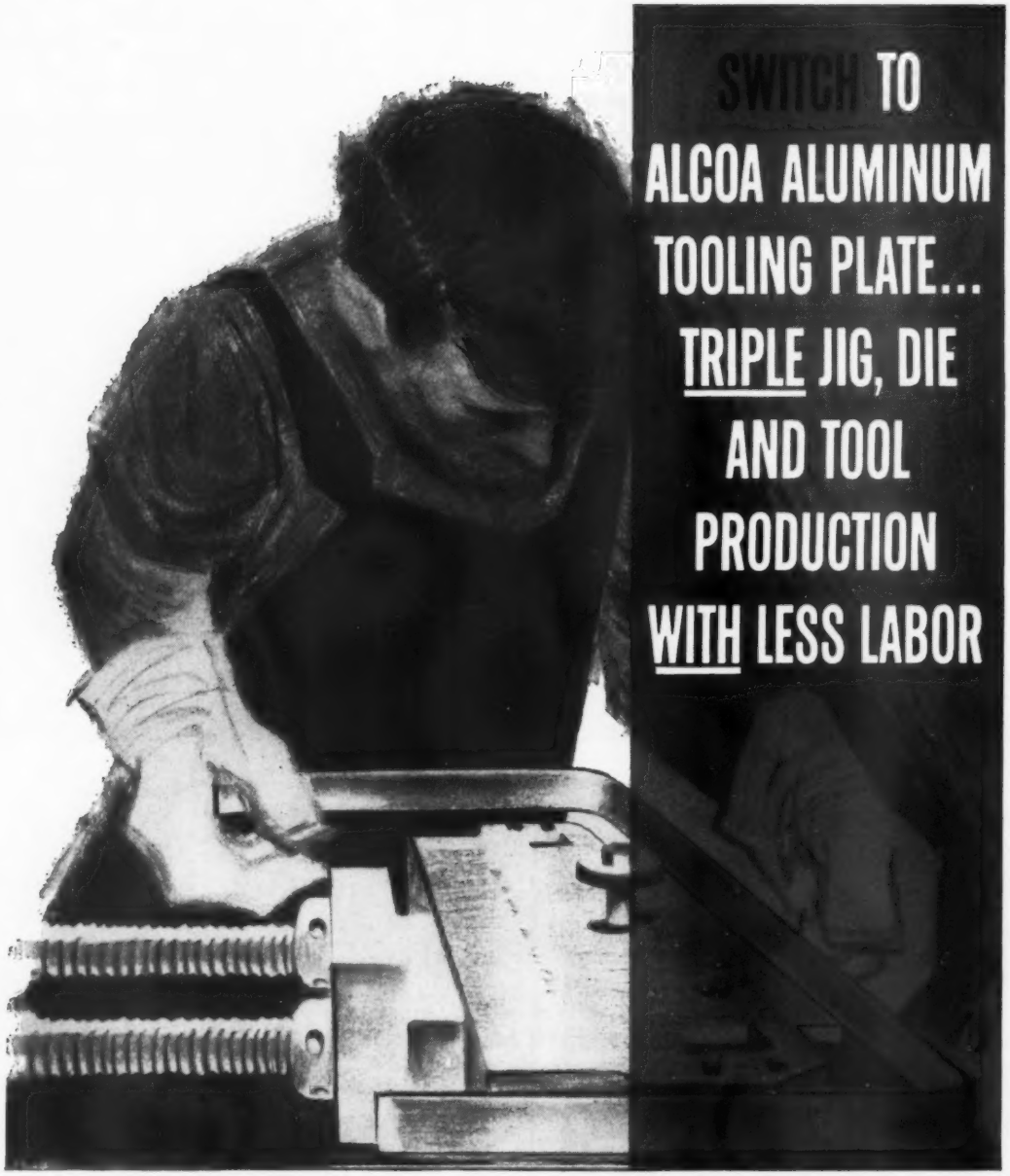

SWITCH TO ALCOA ALUMINUM TOOLING PLATE... TRIPLE JIG, DIE AND TOOL PRODUCTION WITH LESS LABOR

That's a mighty big order for any shop, but Alcoa® Aluminum Tooling Plate and Alcoa Tool and Jig Plate can fill it. Here's a case in point. You can make three times as many core blower plates from 100 pounds of Alcoa Tool and Jig Plate as compared to the number obtainable from 100 pounds of conventional tooling plate. Now add these other savings: aluminum machines three times faster with better accuracy . . . machines and tools last longer . . . less maintenance is required.

Slash Labor Costs as Much as 60 Per Cent. Along with aluminum's high-speed machining characteristics, you get all-important light weight for savings in handling. Because it weighs but one-third as much as iron or steel, changeovers are reduced to a one-man job. An aluminum jig takes less time and work to open, close, move, store or set up.

Call Your Local Alcoa Distributor. Order locally from a wide selection of sizes and gages, cast or rolled. Alcoa Tool and Jig Plate is ideal for high-precision tooling needs. Alcoa 6061-T6 Tooling Plate is a wrought aluminum plate for high-strength utility requirements.

ALCOA ALUMINUM

Your Guide to the Best in Aluminum Value

Aluminum Company of America
1992-K Alcoa Building, Pittsburgh 19, Pa.

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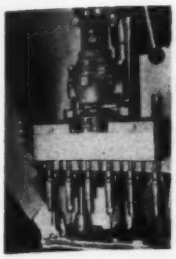


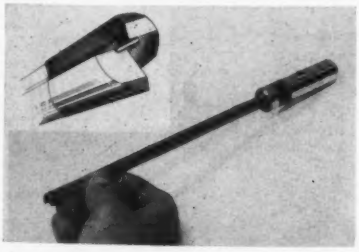
A New Multiple Spindle Drilling And Tapping Spindle Head features lubricated universal ball joints. The Knuckle-head 1000 has six adjustable spindles which can be located anywhere between 15/16″ to 3″ dia even while the unit is running. The heads can be operated in any position on any drill press, drill unit, or tapping machine. Ettco Tool & Machine Co., Inc., 594 Johnson Ave., Brooklyn 37, N. Y., or — **Circle Inform-A-Gram No. A61.**

A Numerically Controlled boring and milling machine, the Schwartzkopff KBF2, that combines production room ruggedness with near jigborer accuracy, is described in a bulletin. Explanations of the controls and features are presented along with a list of specifications. Write to Marac Machinery Corp., 45 S. Broadway, Yonkers, N. Y., for your copy, or — **Circle No. A62.**

A New One Pass Push Broach for high accuracy production keyway cutting offers dependable precision broaching on any type production machine or arbor press. Only four

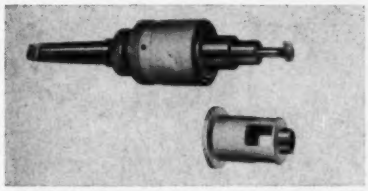
tool parts have to be handled when replacing cutting blades. Models for holes up to 1″ dia and keyway widths up to ¼″ wide are available. The Baj Tool Co., 19751 St. Clair Ave., Cleveland 19, or — **No. A63.**

A Line of Improved Starbore two-flute gun drills features an enlarged coolant hole in the molded carbide tip which provides a 100% increase in coolant flow to the



two cutting edges. This improves surface finish of produced holes, and prolongs tool life between grinds. Star Cutter Co., 34500 Grand River Ave., P. O. Box 376, Farmington, Mich., or — **Circle A64.**

A New Automatic Recessing Tool is designed with a single-joint construction to solve the shatter problem. Deflection and runout are



eliminated because of the long solid bar with extremely long supporting surface. Madison Faessler Tool Co., Moberly, Mo., or — **Circle A65.**

Machining

PRODUCTS & PROCESSES & PRODUCTS

Cut Practically All Metals with the Model 1-A Sever-All dry abrasive cutting machine described in a 4-page folder. Up to 2″ square solids, 3½″ OD pipe tubing, 3″ x 3″ angle iron, and up to 4″ channels can be handled. Other specifications and advantages are given in Bulletin DH-106 from Allison-Campbell Div'n., American Chain Cable Co., Inc., 929 Connecticut Ave., Bridgeport 2, Conn., or — **Circle Inform-A-Gram No. A66.**

2548

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this
DIE-PART PORTELVATOR®
(OR AN ENGINEERED VARIANT)
will speed your work
and ease your "handling."
Top plate raises and lowers for fitting operations
and rotates 360° to give easy access to die.

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FREE Bulletin No. 2548.
It gives full details.

THE HAMILTON TOOL COMPANY • 832 SOUTH NINTH ST.
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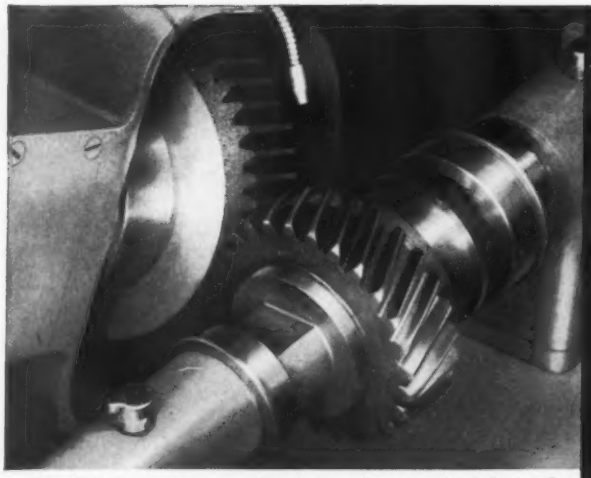
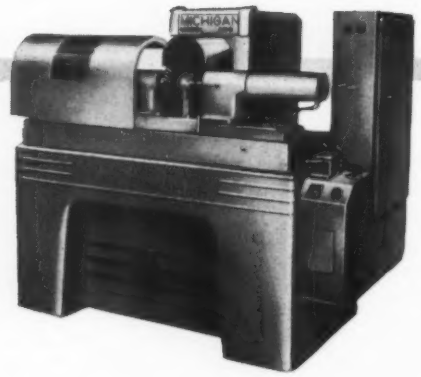


The finishing action—an abrasive tool rotates in tight mesh (and drives) the hardened work gear in a crossed-axes relationship. The table traverses the work the full face width.

Grit content of the abrasive-plastic tool varies with application. Relatively inexpensive, the throwaway tools actually become even more accurate as they "wear in".

Announcing HARD GEAR FINISHING...

...new process removes nicks and surface imperfections after heat treating to give you quiet, smooth-running gears. Uses long-life throwaway tools to slash rejections



Abrasive Hard Gear Finisher (Model 999), a compact, functionally styled machine cleans up and silences hard gears in about one minute. With horizontal axes, the finisher is easily tooled for semi- or full-automatic operation. An integrated gear speeder and/or crowning attachment are optionally available with the machine.

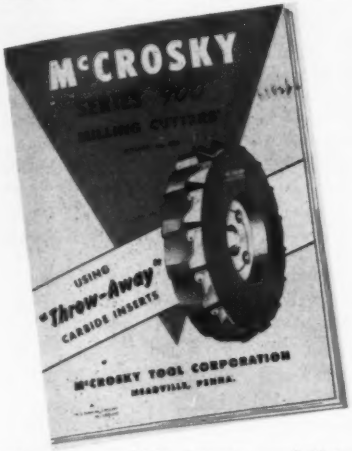
Now you can obtain consistent quietness and smoothness on your hardened small- and medium-sized gears (up to 12-inches diameter). Michigan Tool's Abrasive Hard-Gear Finisher does the job quickly and effectively at low cost. It uses amazingly long-life abrasive-impregnated tools to remove nicks and burrs, improves finish, and tightens dimensional accuracy by further refinement after heat treat. It all adds up to quiet, lower cost gears. Full details in Bulletin 999. Write for it.

MICHIGAN TOOL Company

7171 E. McNICHOLS RD., DETROIT 12, MICH., U.S.A.
IN CANADA: COLONIAL TOOL CO. LTD.

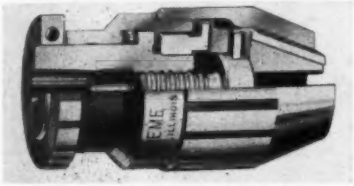
CIRCLE INFORM-A-GRAM KEY NO. 124

Miller Milling Cutters using throw-away carbide inserts are discussed in a bulletin from McCrosky Tool Corp., Meadville, Pa. Construction of cutters for using square and



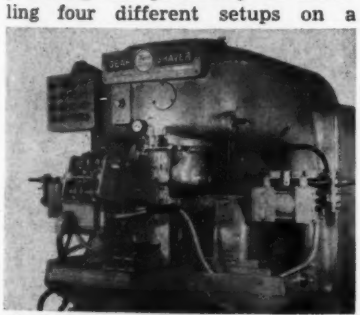
triangular carbide inserts, and lists of sizes and dimensions of various mills, are included. Get Bulletin 582 from the company, or — **A67.**

A Keyless Industrial Chuck, the Precisionist, is used on production lines and in toolrooms wherever close tolerances are necessary. Run-out is held to a minimum, and the



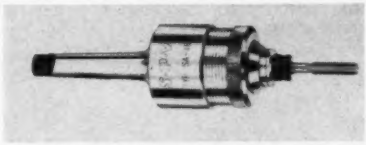
ball bearing construction means a 100% sure grip on cutting tools, while allowing the chuck to be opened easily with the fingers. Supreme Products Corp., 2222 S. Calumet Ave., Chicago 16, or — **A68.**

A Red Wing Automatic Loader handles cluster-type gears on rotary gear shaving machines, thus providing the possibility of handling four different setups on a



single part. Cutter changes, center distance adjustments, and axial positioning of machine head, tailstock, and loader are easy. National Broach & Machine Co., 5600 St. Jean, Detroit 13, or — **A69.**

This Tapping Attachment produces a precision thread because it features a free-floating spindle with weightless axial movement.



The S. P. V. Tapmaster is described in a folder supplied by Homestrand, Inc., 9 Addison St., Larchmont, N. Y., or — **Circle No. A70.**

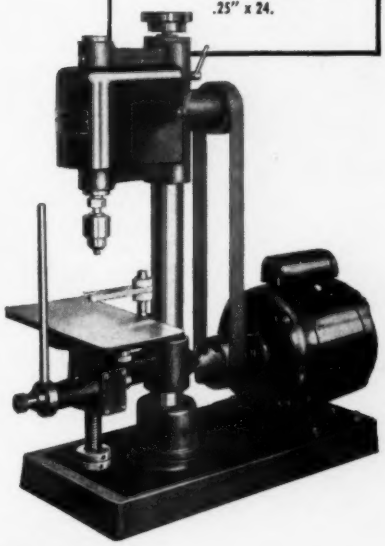
Machining

PRODUCTS & PROCESSES & PRODUCTS

"Multiple Spindle Bar Automatic" features the model 7/16" RA-6 automatic screw machine for automatic small part production. Design and construction advantages are explained and brief descriptions of the standard attachments are also given. Specifications are listed. Get Bulletin MRA-58 from The National Acme Co., 170 E. 131st St., Cleveland 8, or — **A71.**

Now *Precision* TAPPING OF THIN AND BRITTLE MATERIALS

Hamilton Super Sensitive, Small-Hole, Precision Tapping Machine.
Capacity — .034" x 120 to .25" x 24.



Recent design change provides a simple homing device as a standard component of the

HAMILTON
SUPER SENSITIVE, SMALL-HOLE
PRECISION
TAPPING MACHINE

and makes routine of such problem work as the tapping of precision holes in thin metal sheets or in brittle plastics. Even improves performance in the tapping of blind holes!

YOU

will want full information about this important development!

WE WILL FURNISH IT

FREE

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BULLETIN No. 2463

ADDRESS

THE HAMILTON TOOL COMPANY
832 South Ninth Street
HAMILTON, OHIO

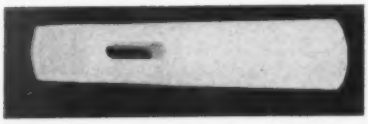
IT'S A Hamilton Tool
USE IT WITH CONFIDENCE

2463

CIRCLE INFORM-A-GRAM KEY NO. 125

Machining
PRODUCTS & PROCESSES & PRODUCTS

Salvage Drills scored or with broken tangs easily and economically with a Rick Use-Em-Up nylon drill sleeve. It fits over the



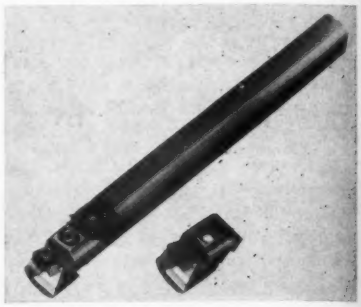
damaged shank, absorbs galling, and keeps the drill true. For more information, write Rick, Inc., 2630 W. 12th St., Erie, Pa., or — **A72.**

Eliminate Dry Cutting Methods at low cost with the new mist coolant generator now available from The Kett Tool Co., 5055 Madison Rd., Cincinnati 27. Models include

a one-gallon size with one or two mist outlets, and a four-gallon size with 1, 2, 3, or 4 outlets. Write to the company for more information, or — **Circle Inform-A-Gram No. A73.**

Hollow Aluminum Machining Stock information is contained in a revised brochure that lists complete tables of standard sizes available in round and hexagonal shapes, giving wall thicknesses, dimensions, and weight/ft. Get your copy from Harvey Aluminum, 19200 S. Western Ave., Torrance, Calif., or — **Circle Inform-A-Gram No. A74.**

Boring Bars with adjustable and interchangeable heads of new Kennametal design are now available in a line with either solid steel shank or steel core encased in a



Kennametal sleeve. Styles BB-3000 and BB-5000 come in 1" to 2½" dia and are used with chucking machines and semi-automatic lathes. Kennametal Inc., Latrobe, Pa., or — **Circle Inform-A-Gram No. A75.**

Twist Drills and Tools are listed in a 40-page catalog which gives complete specifications for high speed tools, carbide, and carbon

tools, and a number of accessories. For your copy of Catalog C-58, contact Precision Twist Drill & Machine Co., Crystal Lake, Ill., or — **Circle Inform-A-Gram No. A76.**

Both NEW *and* DIFFERENT SHELDON 15" PRECISION LATHES

ER60P
5' bed—31" centers

NEW

New. Revolutionary double-box Headstock (Pat. Pend.)
New. "WORK-HOLDING ONLY" Spindle.
New. Single-Shift Back Gear Lever on Headstock.
New. Headstock and Apron running in oil.
New. 1⅛" Hole through Spindle.
New. 60-pitch Gear Box with built-in Lead Screw Reverse.
New. Amazing LOW PRICE.

DIFFERENT

Different. Spindle rigidly held in two large "Zero Precision tapered roller bearings arranged in box-type design.
Different. Electrical switches and push-button stations fully enclosed in built-in well in headstock.
Different. Two independent clutches in apron for selecting power feeds.
Different. Cam-action tailstock clamp for rapid release and instant locking of tailstock.
Different. Triple, cogged, V-belt outboard drive—eliminates intermediate shafts—delivers more power to spindle.

$2350.00 base price F.O.B. Factory (Less Electricals)

This is an all new lathe that bridges the gap between conventional belt driven and geared head lathes. It combines the capacity and power of a geared head with the economy and flexibility of a belt driven lathe. Available with 5', 6' and 8' bed lengths providing 31", 42" and 66" center distances.

Write for Circular

SHELDON MACHINE CO., INC. 4235 Knox Avenue • Chicago, U.S.A.

Now on display and being demonstrated by SHELDON Dealers everywhere, including:

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Aurora (Ill.)	Valley Supply Tool Co., Inc.	Elkhart (Ind.)	Niblock Machinery, Inc.
Boston	Chandler & Farquhar Company	Houston	Rex Supply Corporation
Bridgeport	J. L. Lucas and Sons, Inc.	Los Angeles	Harron Rickard & McCone Co. of So. Calif.
Buffalo	Beals, McCarthy & Rogers, Inc.		Seaboard Machinery Company
Chicago	O'Connell Machinery Company	Milwaukee	State Machine Tool Company
	Boyd Wagner Company	Minneapolis	Satterlee Company
	Crown Supply Company	Newark	Ralph Hochman Company
	Harry Lee and Sons Company	New Orleans	Dixie Mill Supply Company
Cincinnati	Cincinnati Machinery Company	New York City	Morris Abrams, Inc.
Cleveland	Garco Machinery, Inc.		Rudolph Bass
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CIRCLE INFORM-A-GRAM KEY NO. 126

HAVE YOU CHECKED YOUR COUNTERSINKING COSTS LATELY?
A Severance CARBIDE ECONO-SINK WILL GIVE YOU —
INCREASED ACCURACY
MORE PRODUCTION
LESS DOWN-TIME
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WITH THE NEW Severance CARBIDE ECONO-SINK YOU GAIN ALL THE ADVANTAGES OF CARBIDE TOOLING - AND AT LESS COST per Countersunk Hole
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Severance TOOL INDUSTRIES INC.
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ROTARY BUSHINGS

For DRILLING, CORE DRILLING, ROUGH and FINISHED DRILLING

The inner race of the GATCO bushing rotates with the tool, piloting the tool accurately below or above the work — or both

Eliminates expensive tool construction — Reduces tool wear — Prevents seizure and pilot breakage — Especially adapted where precision is required.

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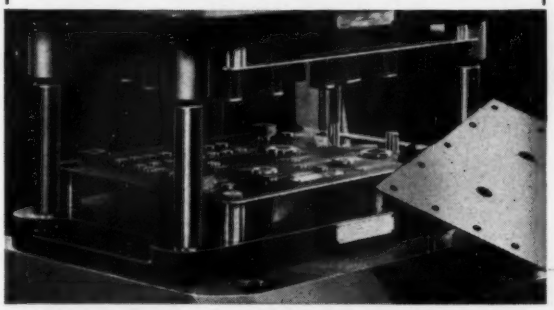
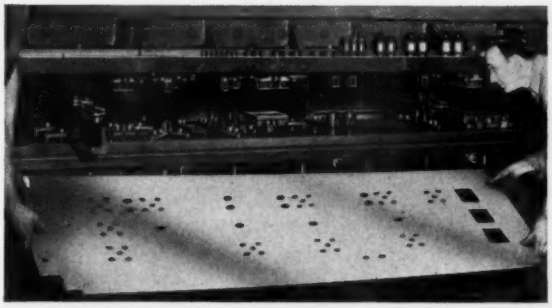
OVER 2700 PLANTS
are saving money with
WHISTLER DIES



MAGNETIC PERFORATING DIES

All parts reusable and interchangeable. Punches and dies stocked in .001" increments from .100" thru .500" dia.



ADJUSTABLE PERFORATING DIES

All parts reusable and interchangeable. Punches and dies stocked in .001" increments from .100" thru .500" dia.

manufacturer of all types of CUSTOM DIES for over 40 years

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748 Military Rd., Buffalo 23, N. Y.

Mail the following: ☐ Magna-Die Catalog ☐ Adjustable Die Catalog ☐ More information on custom die work

NAME _____ TITLE _____

COMPANY _____

STREET _____

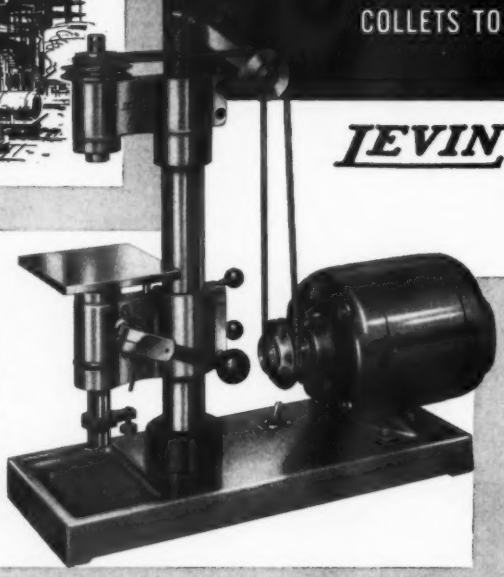
CITY _____ ZONE _____ STATE _____

CIRCLE INFORM-A-GRAM KEY NO. 1273

EQUIP FOR THE SIZE OF THE JOB

SMALL DRILLS MUST BE HELD IN PRECISION COLLETS TO ASSURE ACCURACY

LEVIN® MICRO DRILL PRESS FOR VERY SMALL HOLES DOWN TO .002"



SPECIFICATIONS:
Size of table is 3-3/4" x 4". Maximum table travel is 1-1/2". Greatest distance between table and end of spindle 4". Preloaded ball bearing spindle with four speeds 1725, 2600, 3000, 4700 RPM. Motor 1/2 HP, 110V, 60C. The micro-drill press may also be had with a 3450 RPM motor, doubling the above speeds.

In the LEVIN micro-drill press drills are held in precision collets. Runout is reduced to practically zero and drill breakage from this cause is eliminated. Collets are available in a complete range of sizes down to .1 mm (.004"). **Send for catalog M describing complete line of micro-drilling equipment, collets, instrument lathes and precision tools. Louis Levin & Son, Inc., 3610 S. Broadway, Los Angeles 7, California.**

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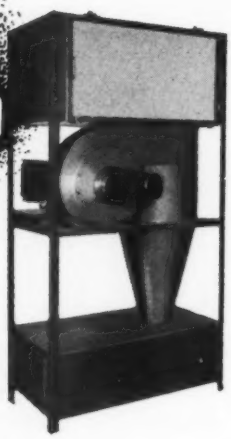
EFFICIENT–LOW COST Dust Collection



Easy installation . . . efficient low-cost operation . . . simplified maintenance, make Dustkop *FIRST* among equipment to collect most all industrial dusts. There are Dustkop models to eliminate your dust problems . . . that are space saving, self-contained units, or exhaust type for rafter, ceiling or outside location. Write for descriptive literature.

DUSTKOP STOPS DUST

37 STANDARD MODELS TO CHOOSE FROM
• READY TO USE

Also a Complete Line of Mist Collectors

AGET MANUFACTURING COMPANY
1394 E. CHURCH ST. • ADRIAN, MICHIGAN

CIRCLE INFORM-A-GRAM KEY NO. 1282

quicker precision tapping CUTS COSTS

$59.50 FOR FACTORY

Dahlstrom Tap Guide

- *Do precision tapping by hand*
- *Tap by lathe with spindle*
- *Tap through open bases for big jobs*
- *Carry to jobs or fasten to bench*
- *Serves as a handy tap extension*

REDUCE TAP BREAKAGE IN YOUR SHOP!

The Dahlstrom Tap Guide works straight and square to eliminate most costly tap breakage. Anyone can operate it—just slip a tap and adaptor into the spindle and turn the handle. Equipped with nine adaptors from 8-32 to ¾" (taps not furnished) . . . depth of throat 7½", opening 7" . . . 8 x 11¼" table area . . . wt. approx. 32 lbs. Order this tap-protecting time saver for YOUR shop.

Ask for the illustrated bulletin that includes information on the $1.75 Dahlstrom Automatic Stock Feed Stop.

Branch MANUFACTURING COMPANY
16 Olsen Drive, North Branch, Minn.

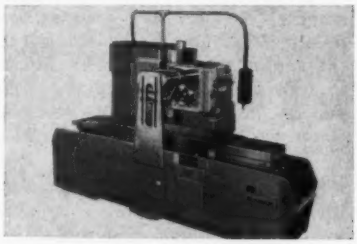
CIRCLE INFORM-A-GRAM KEY NO. 1283

Use Only One Toolholder to replace six fixed-position toolholders with the new Maxwell universal-positioning Uni-MAX. It holds

any 3/16" to ½" tool bit or boring bar in any horizontal work position on lathes, planers, shapers, and slotters. For information, write Maxwell Industries, Inc., 493 E. 5th Ave., Ashtabula, Ohio, or — **A77.**

A Clamping Tool catalog published by Wilton Tool Mfg. Co., Inc., Schiller Park, Ill., contains applications, construction, and specification data on over 400 items. All types of cylinders, vises, and clamps are included in the 50-page catalog. For your copy of Catalog 114, write to the company, or — **No. A78.**

Automatic Production Milling by dialing the results directly from the blueprint before machining is provided on Kearney & Trecker's new bed-type milling machine. With the Mil-waukee-Mil the op-

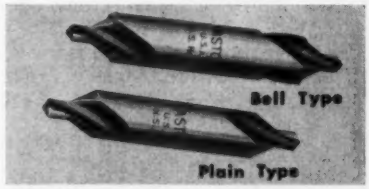


erator simply dial-programs machine functions on the Dial-A-Cycle control panel by means of phase-switch dials which control each machine function automatically. Kearney & Trecker Corp., Milwaukee 14, Wis., or — **No. A79.**

Horizontal Boring Mills are described in a 6-page bulletin from The Cincinnati Gilbert Machine Tool Co., 3366 Beekman St., Cincinnati 23. Pendant control and other design features are summarized, and dimensions are given for the 4" and 5" table-type horizontal boring, drilling, and milling machines. Write to the company for a copy of Bulletin 1157, or — **No. A80.**

"For Automatic Control and Operation of Ram Type Turret Lathes. . ." is the title of a booklet which discusses the De Silvey Director, an attachment for automating lathes. The booklet shows how it is used and the different components of the control. Get your copy from The De Silvey Corp., 200 Pennsylvania Ave., E. Aurora, N.Y., or — **Circle Inform-A-Gram No. A81.**

Combined Drills and Countersinks are now being produced by Fastcut in all old standard letter sizes as well as the new number

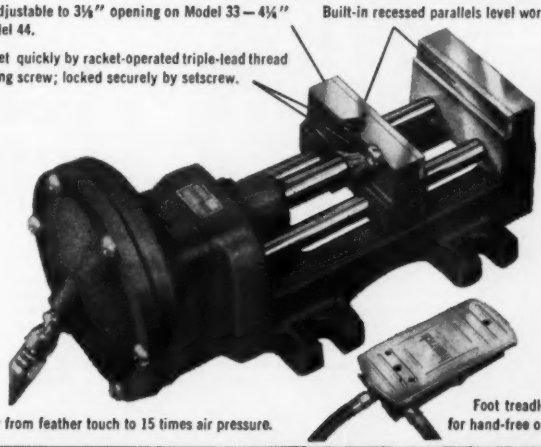


sizes. These center drills are made of high speed steel and are precision ground to exacting tolerances. Fastcut Tool Co., 7405 E. Davison, Detroit 12, or — **Circle No. A82.**

NOW heinrich AIR VISES

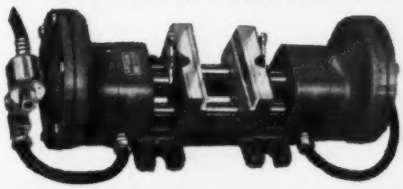
IN TWO SIZES—3" or 4" JAW WIDTHS
FOR HIGH-SPEED PRODUCTION

Jaws adjustable to 3⅛" opening on Model 33—4¼" on Model 44.
Jaws set quickly by racket-operated triple-lead thread adjusting screw; locked securely by setscrew.
Built-in recessed parallels level work.



Holding power from feather touch to 15 times air pressure.
Foot treadle control for hand-free operation.

HEINRICH SELF-CENTERING AIR VISE



Movement of jaws synchronized within a tolerance of .001" by gear and rack. 4" wide jaws adjustable to 4⅛" opening, travel ⅜" each jaw; total ¾".

HEINRICH AIR CLAMP

Eliminates bothersome hand clamping. Piston rod setting adjustable to 3⅛". Maximum travel ⅜". Height 6⅛", width 5¾".

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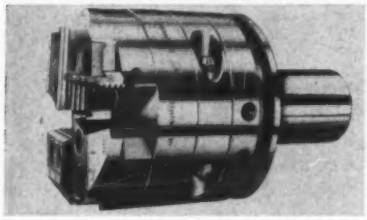
heinrich TOOLS, INC.
DEPT. 138-F, RACINE, WIS.

CIRCLE INFORM-A-GRAM KEY NO. 129

Machining

PRODUCTS & PROCESSES & PRODUCTS

Use the Heat-Treated, revolving die head developed for application on automatic screw machines and other machines employing a live spindle. The new JN Landex, recommended for commercial threading, is available in ½", 13/16", 1¼", and 2" sizes. Landis Machine Co., Waynesboro, Pa., or— **A83.**

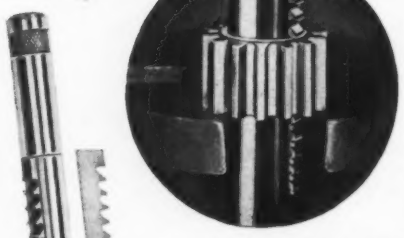


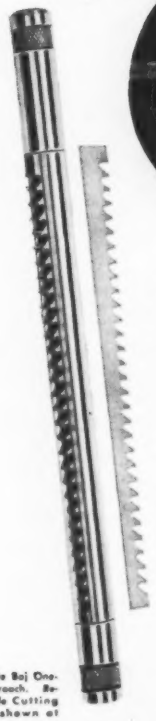
Recessing Tool Operations and low-cost automation applications are highlighted in a catalog which includes data on boring and reaming tools, grinding fixtures and arbors, bore gages, and boring heads. Maxwell Industries, Inc., 493 5th Ave., Ashtabula, Ohio, supplies copies of Catalog T-6, or — **A84.**

NEW

The Baj One-Pass Push Broach

. . . for High Accuracy Production Keyway Cutting





* SAFETY
* ECONOMY
* SPEED
* ACCURACY

This new broach is a non-adjustable version of the Glenny Adjustable Expansion Broach formerly produced by the East Shore Machine Co., Cleveland, Ohio. Both of these excellent tools are now being manufactured and sold by The Baj Tool Co.

For high accuracy production keyway cutting, the Baj One-Pass Push Broach introduces these outstanding features:

1. SIMPLE, FAST AND EASY TO OPERATE—a complete unit with no accessory parts. No guessing. No measuring. Broach is preset for standard sizes. Just pull the arbor press handle and it positively cuts its own way. Minimum set-up time.
2. REPLACEABLE HIGH SPEED STEEL CUTTING BLADE.
3. EXCLUSIVE BODY DESIGN—totally houses replaceable blade, adds strength for safety. Allows coolant flow to accelerate cutting action. Extends broach life.
4. HIGH ACCURACY—keyways are cut straight and centered, accurate to .0005 plus or minus.
5. LONG LIFE—production reports claim up to 100,000 keyways without replacing the Baj Keyway Broach. The easy cutting, trouble-free and time saving features of this new production broach introduces new economies in keyway cutting that repays—many times over—the original low cost of the broach.
6. WIDE RANGE OF STANDARD SIZE BROACHES.

Exclusive Distributor Territories are open.

WRITE FOR DETAILS

Complete Baj One-Pass Broach. Replaceable Cutting Blade shown at right.

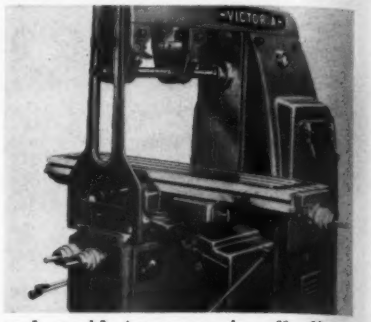
The Baj Tool Company

19751 ST. CLAIR AVENUE • CLEVELAND 19, OHIO

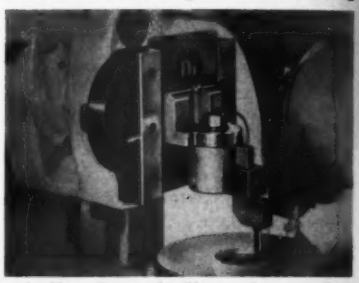
MANUFACTURERS OF BAJ ONE-PASS AND GLENNY ADJUSTABLE EXPANSION BROACHES. FORMERLY BROACHES WERE FORMERLY PRODUCED BY EAST SHORE MACHINE CO., CLEVELAND, OHIO.

CIRCLE INFORM-A-GRAM KEY NO. 130

A New Milling Machine, the U2 Rapidmil, completes the Victoria line. Backlash eliminator, mechanical overloads, and one-shot lubrication have been added to power and rapid traverses in all directions. Get details from Bentley Industrial Corp., 41 E. 42nd St., New York, or — **Circle No. A85.**



A Universal Slotting Attachment enables machines with a vertical head adapter to do many jobs requiring a shaper. Stroke is adjustable up to 2½" with strokes/min the same as the rpm of the driving spindle. A swiveling clapper box pivots 90° to the right and left of the center permitting great latitude in tool and work setup. The Robert E. Morris Co., West Hartford, Conn., or — **Circle No. A86.**



Solve Indexing Problems using the Zierco lathe head, a multiple indexing unit that provides 48 repetitive indexing positions. Every tool has a major and minor cutting edge; the minor edge, heretofore, having little use. The multiple positioning of this head utilizes this edge effectively. The Zierden Co., 3817 S. Kinnickinnic Ave., Milwaukee 7, or — **Circle No. A87.**

GEORGE L. DETTERBECK CO.

SINCE 1911

World's Largest Exclusive Manufacturer of
SCREW MACHINE TOOLS!

CUTTING CAMS
HIGH SPEED STEEL AND CARBIDE FORM TOOLS
SPECIAL CUTTING TOOLS
SPLIT DRILL BUSHINGS
CROSS SLIDE KNURL HOLDERS
TOOL BITS
BOX TOOLS
BURNISHING TOOLS
REVOLVING STOPS
RECESS SWING TOOLS
FORMING SWING TOOLS
Standard sizes 00, 0, 2, carried in stock.

We specialize in one thing only . . . designing and making SCREW MACHINE TOOLS!

47 years experience goes into every tool we make. They come to you ready for use . . . Precision design . . . Skilled workmanship . . . Finest materials.

Our extensive facilities save you TIME . . . MONEY . . . and give you accuracy, quality and quick service.

• 47 Years at the Same Address

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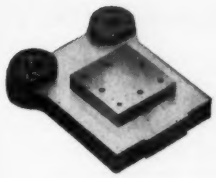
1871 Clybourn Avenue • Chicago, Illinois

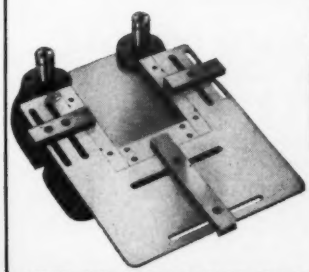
CIRCLE INFORM-A-GRAM KEY NO. 1311

Punches and Dies

Notching Die with Gauge Table

MUL





Standard stock sizes 4", 5" and 6". Lick those Notching Problems QUICKLY. Gauge table and gauging bars provide accuracy and speed with easy adjustment.

This is another of the many different kinds of punches and dies in stock or made to order for foot, hand or power operation. Precision made from high grade tool steel. Also adaptors and die shoes to convert your press.

26 ***years of serving your punch and die requirements.***

What are your punch and die needs? Consult us about your problems. Prompt service on "Specials" made to your order.

SEND FOR FREE CATALOG No. 157 AF, illustrating our standard punches and dies and complete line of modern sheet metal fabricating equipment. **Net prices shown.**

WARD Machinery Co. 564 West Washington **Chicago 6**

CIRCLE INFORM-A-GRAM KEY NO. 1313

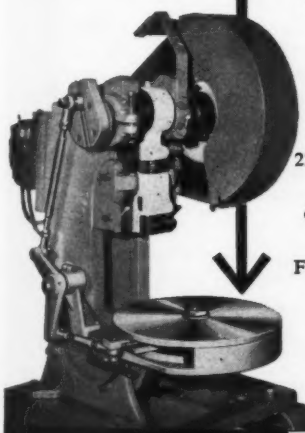
Make Your Press Almost Automatic!

The new benchmaster Dial Index Feed

FOR PUNCHING, RIVETING, STAKING, ASSEMBLING!

Now you can get a finished part or perform an assembly operation with every revolution of the punch press flywheel . . . with extreme operator safety and at strokes up to 280 per minute! Choice of 12" or 15" tables, 10 or 12 stations.

LOW HEIGHT—only 2⅜" overall . . . allows greater use of press shut height, more space for tooling! Repeats accurately, 220° dwell between indexing for ample tool engagement and withdrawal. Attaches directly to bolster area. Can be used with Benchmaster Automatic Friction Roll Feed. All wearing parts heat-treated. Special dropoff provided for in mounting base. Fits Benchmaster presses and most others.



benchmaster

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25%
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increase press time
preserve alignment
Discover how inexpensive ELASTICONES can provide increased production, lower die costs by closing the gaps between pins and bushings, reducing die breakage and maintenance. Just snaps into place — no installation or maintenance costs! Bulletin 53 contains complete information. Send for it today!

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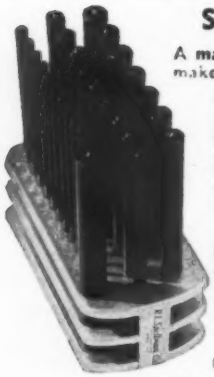

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There are 68 different models and types of Palmgren vises, rotary tables, milling attachments and other machine tool accessories, with jaw sizes from 1½" to 8". Ask for your copy of this FREE Catalog No. 205 today, showing the complete line, details and prices.

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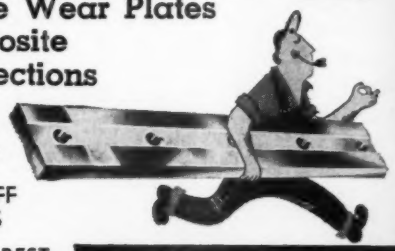
CIRCLE INFORM-A-GRAM KEY NO. 1324

The Inform-A-Gram card which follows page 100 is for your convenience in making inquiries about advertised Products and Editorial items.

Immediate delivery on OK Bronze Wear Plates Composite Die Sections



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Easy to work . . . full instructions provided with each shipment.

Complete stability . . . moisture and humidity does not affect size.

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Standard sizes and a variety of thicknesses carried in stock. Prompt shipment.

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GAGE COMPANY

MAKERS OF PRECISION PLASTIC DEEP-ETCH CHARTS

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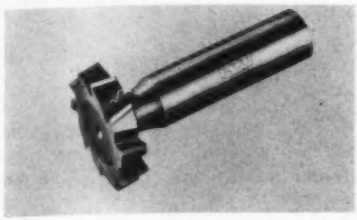
CIRCLE INFORM-A-GRAM KEY NO. 1326

Staggered Tooth Woodruff Keyseat Cutters have been announced by Keo Cutters, Inc., 25040 Easy St., Warren, Mich. All standard sizes,

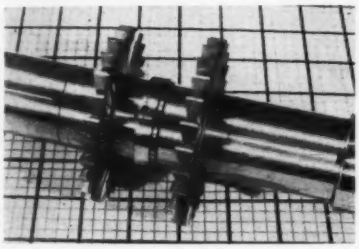


separate or in sets, ranging from ¼" dia and 1/16" thickness to 1½" dia and ⅜" thickness, are available from stock. They are all of high speed steel with ½" shank.

Circle Inform-A-Gram No. A88

"Marking Tools" contains detailed information on hand stamps, code stamps, lettering dies, knurls, and knurl holders. Specifications and illustrations are included for each item. Tips on how to order are also given. Geo. T. Schmidt, Inc., 4112 Ravenswood Ave., Chicago 13, publishes the catalog or— **No. A89**

Improved Micrometer Adjustable Spacing Collars for use on milling machine cutter arbors have been announced by Dayton Rogers Mfg. Co., Minneapolis 7. These collars



make it possible to adjust the cutter spacing accurately and can be used on multiple setups on milling machine equipment. Contact the company for more information, or — **Circle Inform-A-Gram No. A90**

"Accuracy to 0.0001" is a bulletin which introduces the Micro Dial boring head. It can be preset out of the machine; then, after the initial cut is made and measured, the hole can be set positively to final hole size. Get this bulletin from P. M. Instrument Co., 10 Smith Pl., Cambridge 38, Mass., or — **Circle Inform-A-Gram No. A91**

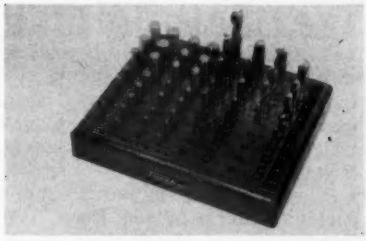
Hand Hack Saws, power hack saws, hole saws, brand saws, hammers, and ground flat tool steel are listed in a catalog-price selector which contains specifications of these items. For your copy, write The Capewell Mfg. Co., Governor St., Hartford, Conn., or — **No. A92**

Two Automatic Power Feeds for regular and deep hole drilling are described in two bulletins announced by The General Pacific Corp., 8740 Washington Blvd., Culver City, Calif. Features and specifications for Models A and D are given. Contact the company for your copies, or — **Inform-A-Gram No. A93**

Select Proper Tracer Tip for any size end mill for any type of cut using the kit consisting of an assortment of Turchan tracer tips and Arrow end mills. Included are 26 end mills with 32 different tracer tips coded to match the end mills.

Machining

PRODUCTS & PROCESSES & PRODUCTS



Write to Turchan Follower Machine Co., P. O. Box 6055, Dearborn, Mich., for more information, or — **Circle Inform-A-Gram No. A94**

This blade could have been packaged and shipped as a genuine MARVEL High-Speed-Edge Blade . . . and it might have performed to a customer's satisfaction. Instead, it was rejected and will be scrapped because inspection revealed a minute imperfection.

There's nothing unusual about this. Certainly, other hack saw blade manufacturers inspect their products, and undoubtedly reject blades for one reason or other, because they are trying to market the best blades they know how to make.

And that's the point—here at MARVEL, where the composite blade was invented and perfected over 30 years ago, we believe we know more about making high-speed-edge hack saw blades than any other maker. We've been at it longer, and the unequalled performance of MARVEL Blades on every kind of material is evidence that we're right.

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FB-122

MARVEL Metal Cutting SAWS
Better Machines-Better Blades

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CIRCLE INFORM-A-GRAM KEY NO. 133

Machining

PRODUCTS & PROCESSES & PRODUCTS

Chemical Milling of cast parts is presented in a bulletin to help design and production engineers remove selected areas of metal from cast parts or reduce the overall weight of castings. Information on techniques, tolerances attainable, and suitability is included. United States Chemical Milling Corp., 1700 Rosecrans Ave., Manhattan Beach, Calif., or — **No. A95**

Light Machining or inspecting of angles on small ferrous parts is speeded up with a new 5" sine

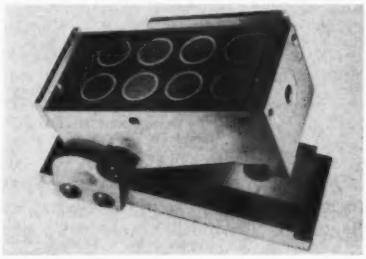
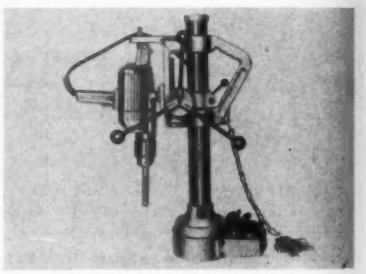


plate with built-in permanent magnetic chuck. The 5" x 3" surface provides large work area and rails on side and end make accurate locating of pieces easy. Bald Eagle Corp., 356 Cedar St., St. Paul 1, Minn., or — **No. A96**

A New Band Saw manufactured by W. Whitney Stueck, Inc., Old Saybrook, Conn., is described in a folder which shows how the saw is able to perform both low-speed sawing and high-speed friction cutting. General specifications, models, and optional features are given. Write to the company for your copy, or, — **Inform-A-Gram No. A97**

A Multi-Cycle Hydraulic Tracer Lathe is discussed in a bulletin, which gives complete specifications for Model 14T. Operational features and some of the typical parts turned out by this machine are listed. Sundstrand Machine Tool Co., 2531 11th St., Rockford, Ill., or — **Circle Inform-A-Gram No. A98**

Precision Electric or Air Drilling in tricky places is simplified with three magnetic drill presses. Models 2MAG, 3MAG, and 4MAG can handle portable air and electric drills



equipped with dead handle sockets and can be clamped to any ferrous surface. Thor Power Tool Co., 175 N. State St., Aurora, Ill., or — **Circle Inform-A-Gram No. A99**

Extend the Life of soluble oil emulsions two to four times with this bacterial inhibitor. Elcide 75 is effective in all standard-duty soluble oil emulsions and can be used for protecting synthetic coolants, too. Eli Lilly and Co., 740 S. Alabama St., Indianapolis 6, or — **Circle Inform-A-Gram No. A100**

Quick Change Woodruff Cutters are introduced in a bulletin which gives advantages and complete dimensions. A detailed diagram of the cutters is also given. Quality Tool Works, 760 S. Market St., Waukegan, Ill., or — **No. A101**

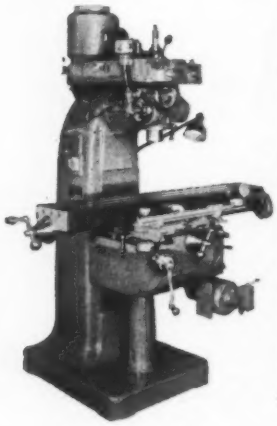
Produce MORE... Produce it BETTER!

ON THESE IMPROVED ECONOMICAL

INDEX VERTICAL MILLS

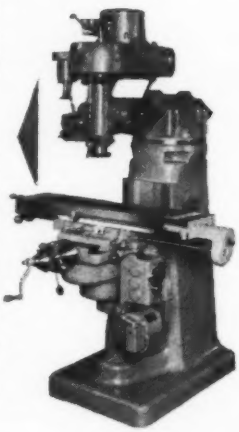
Super "55" MILL

1½ HP Head or optional 2 HP with continuous duty motor gives 50% or more capacity . . . More rigidity, more accuracy . . . Increased horse power and dynamically balanced Cast Iron Pulleys and Drive System afford improved production capacity . . . More weight in the column, heavier ribbed column, heavier knee, heavier saddle.



Unique square design of overarm affords more rigidity, greater accuracy . . . Provides extra range and capacity . . . More power at the cutter. No adjustment required on overarm and head after use . . . No need to re-indicate head after moving overarm . . . Speed range with nine changes makes possible the use of high speed or carbide tipped cutters to best advantage.

"45" MILL



INDEX MACHINE CO.

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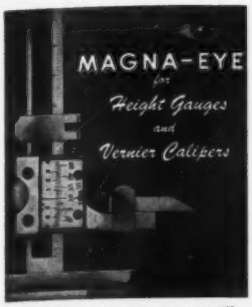
CIRCLE INFORM-A-GRAM KEY NO. 134



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MAGNIFIES the "hard to read" vernier scales on calipers and height gages. No more eye strain, guess work or hit or miss setting and reading. LENS is finest quality optical glass, specially designed and ground for the purpose with utmost optical skill. 4X magnification shows lines true and correct. In daily use in plants of Westinghouse, General Electric, General Motors, Chrysler, Packard, Ford, Boeing Aircraft, Bendix Aviation and many others engaged in defense work.
Made in 3 sizes to fit Starrett, Brown & Sharpe, Lufkin Tools, and others of similar design. $ No. 100 for 6" Vernier Calipers; $ No. 200 for 10"-12" Height Gages, also 10"-18"-24" Vernier Calipers; $ No. 300 for most popular type 18" and 24" Height Gages and for 36"-48" 60" and 72" Calipers.
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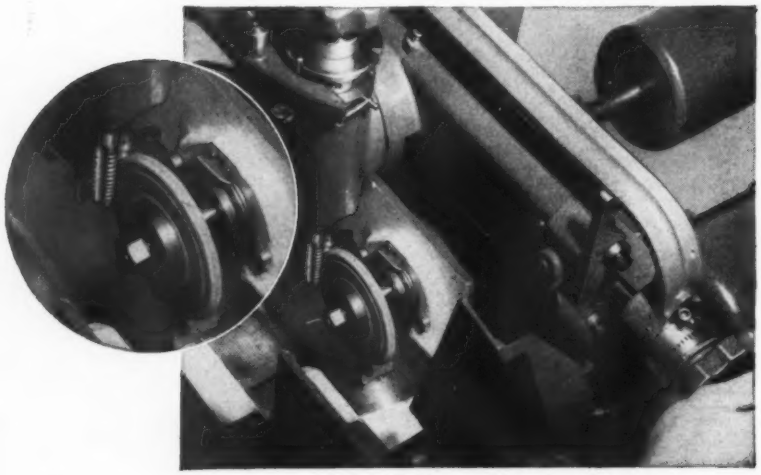
NOW – You can control rake or hook angle and insure accurate indexing of cutting edges* of taps with the BLAKE FLUTE GRINDER.

**Just as necessary on taps as on milling cutters.*



Keep it sharp — Make 1 tap do the work of 6 with The Blake Flute Grinder.

This accuracy will result in uniformity of hole, much longer life for your taps and a surprising savings in tap costs.

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DIE FILERS . . . for straight-line sharp corner filing, sawing and lapping.

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QC and Inspection

PRODUCTS & PROCESSES & PRODUCTS

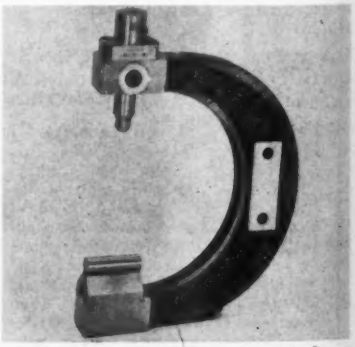
"Precision Gaging" is a folder containing descriptions, dimensions, and illustrations of 15 different gaging applications. Instruments for

checking squareness, alignment, concentricity, and parallelism are included. Get your copy from Federal Products Corp., 1144 Eddy St., Providence 1, R. I., or — **No. A102**

Measure Small Bores and miniature components with the special blocks that simplify checking. They can measure chordal dimensions across serrations, the distance be-

tween cylinders located in serrations and splines, or the space width of straight splines. Engis Equipment Co., 431 S. Dearborn St., Chicago 5, or — **No. A103**

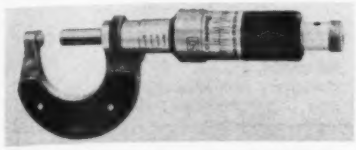
Check Pitch Diameter of gears, splines, and worms with a new checking device introduced by Holmes Gage & Development Corp., 537 Bonham Ave., Columbus 3, Ohio. The device features a sturdy



mechanical amplifier mounted on the gage body to amplify measurements five times. For information, write the company, or — **No. A104**

PRODUCTS & PROCESSES & PRODUCTS

For True Decimal Reading, this window-reading micrometer has been introduced by Opto-Metric Tools, Inc., 137 Varick St., New York 13. Hundredths are read at



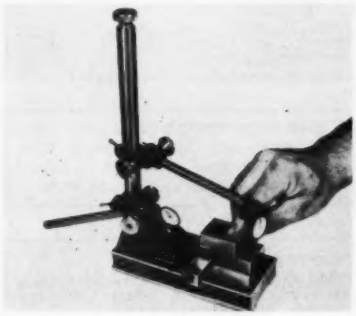
the window; thousandths and tenths on the thimble sections, which are flush to assure accuracy. For information, write the company, or—

Circle Inform-A-Gram No. A105

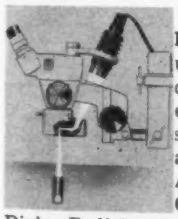
Precision Plastic Deep-Etch comparator scales are discussed in a bulletin. They can be used on optical comparators and for making scale layouts. Dimensions for three styles are listed. Gage Co., P. O. Box 1080, Battle Creek, Mich., supplies copies of Bulletin 58-70, or —

Circle Inform-A-Gram No. A106

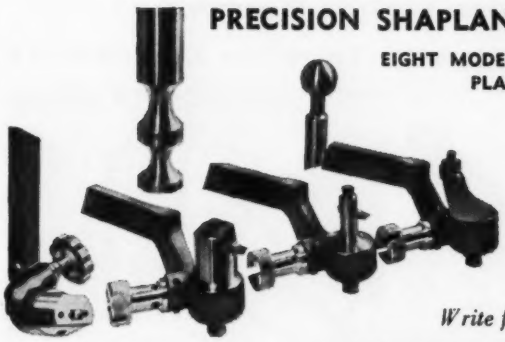
A Combination Dial Test Set and comparator with Rocheleau sliding swivel, when used as an indicator test set, can be adjusted both vertically and horizontally. Used as a universal surface gage with the slid-



ing swivel feature, it gives fine adjustment and allows scribing of lines to fine tolerances. Rocheleau Tool & Die Co., Inc., 650 N. Main St., Leominster, Mass., or — **No. A107**



A New Vertical Illuminator for use with its line of Cycloptic stereoscopic microscopes has been announced by the American Optical Co., Instrument Div'n, Buffalo 15, N.Y. It provides vertical, shadowless illumination into deep, small-diameter orifices where the angle is too acute for standard oblique illumination methods. Get information from the company, or — **No. A108**



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Range: ⅜" to 3" for concave radii on lathes. Two sizes for convex radii (Balls up to 2½" dia.) on lathes. Also heavy duty model for radii to 6" on planers, etc.

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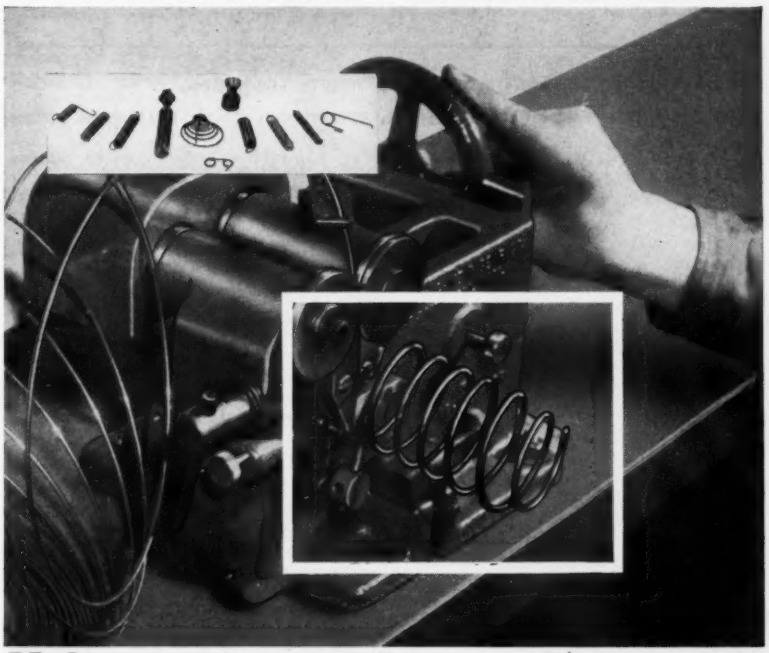

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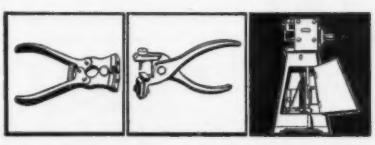

Starret adjustable jaw cut nippers (left) and Gardener Hook-Kon spring looping tool (center) — handy, precision, time-saving accessories for spring coiling. Perkins Spring Coiler available as bench model or power model shown here, (right) for tool shop or continuous runs.

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Special Machinery Division, Dept. B1
W. Springfield, Mass.
Please send information and prices on Perkins Spring Coiler.
Hand Model ☐ Power Model ☐

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Company.....
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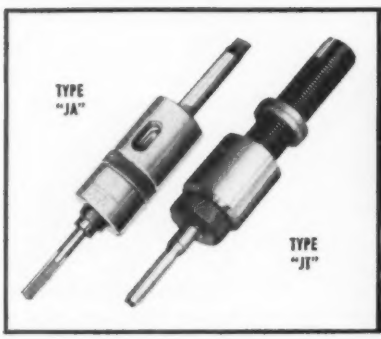
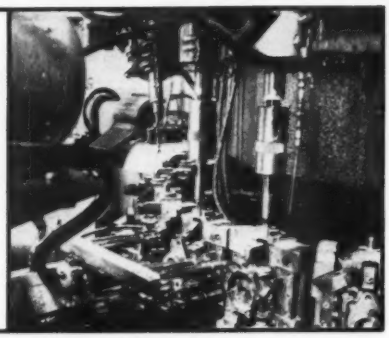
CIRCLE INFORM-A-GRAM KEY NO. 1372

Floating Holders Insure Precision on Reaming and Tapping Operations



Scully-Jones floating holders have small body diameter for close center work. Type "JT" speeds tool changes.



Scully-Jones "JA" floating holders permit drilling and tapping at high speeds with outstanding accuracy.

Scully-Jones design means fewer rejects, less tool breakage, even on high-volume jobs

Misalignment between spindle and workpiece can affect quality, cutting tool life, production rate, and maintenance costs. But, if you attempt to compensate for errors by using "wobble-type" floating holders, you can create other problems that defeat your purpose.

Binding or "dead" spots in certain holders can cause bell-mouthed, or out-of-round reamed holes—oversized or tapered threads. "Cramping" can break fine cutting edges, reduce tool life, and hold up production.

Scully-Jones floating holders guard against misalignment problems caused by index error, machine wear, manufacturing tolerances, and expansion or contraction of machines due to temperature variations by meeting the following specifications:

1. Balanced, constant velocity, flexible drive coupling
2. Freedom of lateral or angular movement
3. Uniform force requirement for moving in all directions
4. Efficient operation after normal wear
5. Minimum efficiency reduction from normal shocks and overloads
6. Sufficient and efficient seals, with proportional physical dimensions
7. Provision for centering pin

By far the most important feature to meet these specifications is our exclusive *double-gear spline drive coupling*. This permits utilizing proper clearance in the spline for required movement of the tool and allows equal freedom of float in all directions. Binding or "dead" spots are eliminated.

Write for Bulletin 8-50. Scully-Jones and Company, 1913 South Rockwell Street, Chicago 8, Illinois.

SCULLY JONES PRECISION HOLDING TOOLS

CIRCLE INFORM-A-GRAM KEY NO. 1381

90FS FLUTE GRINDER

Automatic Universal

Grinds straight or spiral flutes from solid, including carbides, in tools such as:

- Drills as small as 1/16 inch dia.
- Spiral or straight taper reamers.
- Spiral or straight milling cutters and end mills.
- Sharpens saws up to 12 inch in diameter and in gangs up to 7¼" long.

AUTOMATIC INDEX FEED

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CIRCLE INFORM-A-GRAM KEY NO. 1382

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Done to your specifications
We Have
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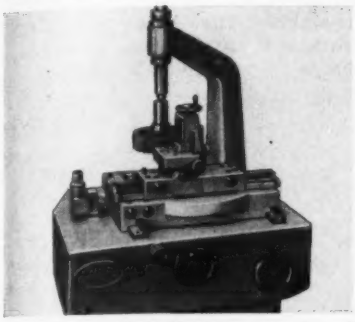
10 Locust Ave., Roseland, N. J.

CIRCLE INFORM-A-GRAM NO. 1383

Fine Accuracy with short inspection time are features of the Mahr 890 involute measuring machine. It checks involute tooth flank profiles



on spur and helical gears, bevel gears, and worm gears. Cosa Corp., 405 Lexington Ave., New York 17, or — **Circle Inform-A-Gram No. A109**

A New Lead Tester combines the ability to check the lead of straight or taper threads, internal or external threads, and taper of threads or cylinders. The Model A Electro-

mechanical tester checks internal threads from 1¼" to 16" dia; and external, 0 to 16" on work as heavy as 500 lbs. Pratt & Whitney Co., Inc., W. Hartford 1, Conn., or — **Circle Inform-A-Gram No. A110**

An Air Comparator Gage, Air-O-Test, is rugged enough for rough shop handling and accurate enough to give consistent readings in split-tenths of a thousand. The gage can be used with simple setups on

lathes and cylindrical and surface grinders for sizing, and on boring machines to show correctly positioned work. Sperman Metal Specialties, 2199G E. 21st St., Brooklyn 29, N. Y., or — **No. A111**

"Industrial Optical Aids" presents descriptions and dimensions of microscopes and comparators. Among its features is an explanation of the pocket-size instrument surface comparator used for checking surface quality right in the plant. Get Catalog D-1059 from Bausch & Lomb Optical Co., 635 St. Paul St., Rochester 2, N. Y., or — **No. A112**

Establish Straight Optical reference lines between distant points with the Reflect-Align telescope manufactured by the F. T. Griswold Mfg. Co., 315 W. Lancaster

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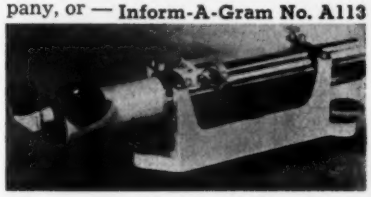
Ave., Wayne, Pa. Errors in angle, defects in parallelism, and direct measurement of linear errors in flatness, alignment, and concentricity in 0.00005" values are possible For information, write the company, or — **Inform-A-Gram No. A113**

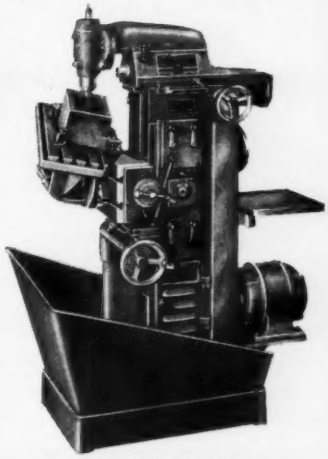


One Machine...Many Applications

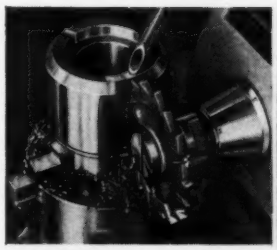
with DECKEL

Universal Millers

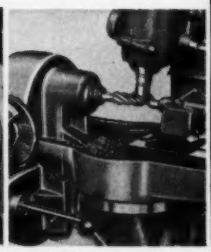
If you're interested in *economy*, without loss of accuracy and dependability, then investigate a Deckel FP-1 Universal Miller. This single, versatile machine handles a wide variety of jobs – from simple tools to the most complex parts. Awkward operations are simplified. Production becomes more efficient. A Deckel FP-1 performs any type of milling – horizontal, vertical, angular or spiral – plus drilling, boring, slotting and punch milling. Use its various attachments to produce complicated pieces with one set-up. Eliminate the cost of special tools, jigs or fixtures. Invest in a Deckel and get a *return* on your investment.



Deckel FP-1 Universal Miller with Vertical Head and Swiveling Angular Table.



Slot milling using Universal Index Head.



Milling flutes of a tapered cutter with Spiral Milling Attachment.

Finish milling a punch using Punch Milling Attachment.

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COSA — *nationwide sales and service of precision machine tools — from bench lathes to boring mills.*

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CIRCLE INFORM-A-GRAM KEY NO. 139

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ARBOR SPACERS SHIMS and SPACING COLLARS • Arbor Spacers and Shims in 20 sizes and thicknesses from .001" to .125". Arbor Spacers furnished with standard keyway; Shims, with no keyway. Also Spacing Collars in numerous popular diameters, and in thicknesses from 1/16" to 3". Hardened and ground; edges chamfered. Furnished with standard keyway.

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SHIM STOCK • Steel or brass. Selected from material rolled to precision limits, free from burrs, and protected by oil coating. Coils packed in carton for easy dispensing and protection. 15 thicknesses, .001" to .032". Sheets 6" x 12"; coils 6" x 120". Available also in two assortment packages —12 thicknesses, .001" to .015", and 15 thicknesses, .001" to .032".

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Pneumatic & Hydraulics

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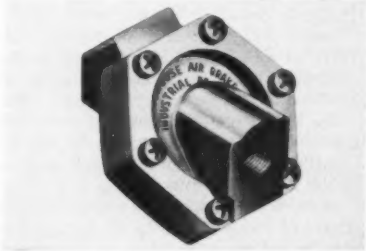
Save Time and Speed Production with this air cylinder operator, designed for use with the Econ-O-Miser ball valve. It can be mounted on either side of the pipe and

on either end of the valve. Manual or electrical control from a central location is possible. Worcester Valve Co., Inc., 16 Parker St., Worcester 10, Mass., or — **No. A114**

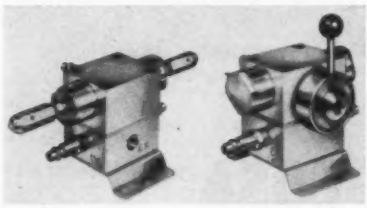
Reduce Distracting Noise with the EMCO silent air exhaust muffler for all pneumatic air devices. Both male and female connections are standard on each unit for quick, easy installation. For information, write to EMCO Pneumatic Corp., 1317-1319 Locust St., Des Moines, Iowa, or — **No. A115**

A Quick Release Valve for faster, more efficient air-pressure venting of cylinders and other pneumatic devices is now offered by Industrial Products Div'n, Westinghouse Air Brake Co., Wilmerding, Pa. Be-



cause of the valve's sensitivity, pressures can be vented in small increments (approximately 6 psi). Write to the company for more information, or — **No. A116**

These New Four-Way Air Valves advance the ram of a double-acting air cylinder and stop it without creeping. Used for hoists and as-

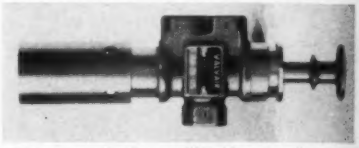


sembly tables, one operates with a lever which moves 45° left or right, and the other with two small limit valves. Mead Specialties Co., Dept. I-93, 4114 N. Knox Ave., Chicago 41, or — **No. A117**

An Automatic-Fill Air Line Lubricator eliminates maintenance and downtime. The A606 Perma Fog features a built-in float mechanism which automatically maintains a

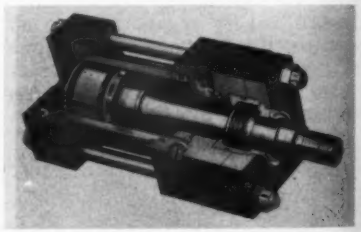
constant oil level in the lubricator bowl. Watts Regulator Co., Industrial Div'n, 10 Embankment Rd., Lawrence, Mass., or — **No. A118**

A Reverse-Acting Panel-Mounted Manual Valve, for up to 200 psi pneumatic and hydraulic or vacuum service, is suited for emer-



gency control applications where a fast push-type action is desirable. Sizes from ¼ through ¾ npt are available. Valvair Corp., 454 Morgan Ave., Akron 11, Ohio, or — **Circle Inform-A-Gram No. A119**

Nineteen Basic Models of the 3000 psi square-head hydraulic cylinders are now available in bore sizes from 1½" through 12". They

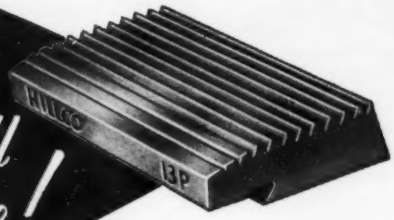


all feature an expansion-type tube seal which prevents extrusion at exclusive shock pressures. For information, write Galland-Henning NOPAK Div'n, Milwaukee, Wis., or —**Circle Inform-A-Gram No. A120**

Uses of Non-Fluid Oil for lubrication of pneumatic tools and equipment are discussed in a bulletin from New York & New Jersey Lubricant Co., 292 Madison Ave., New York 17. Different grades are suggested for different applications. Get Bulletin 559 from the company, or — **No. A121**

"HILLCO" TANGENT CHASERS

We think you'll agree!



The new line of "HILLCO" Tangent Chasers, which can be re-ground for 80% of their original length, are guaranteed to be of highest grade tool steels ground to exacting tolerances. We feel that this complete line of chasers are the finest that we have produced in our 75 years of cutting tool manufacture. We think that you will agree with us.

THE HILL ACME COMPANY
ACME MACHINERY DIVISION
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AT LAST — DURABLE, SIMPLE
QUICK TO INSTALL
DIE STOPS!

Automatic Stop

Cut-Off Stop

Ruggedly constructed for long dependable service, KEYSTONE STOPS are *simple to install*. In fact, an apprentice can install any of them within 15 minutes. Designed by a die maker to solve time consuming die stop problems, they have been brutally tested and prove to be the finest stops available.

Retractable Spring Stop

See for yourself. Discover that you can combine quick installation with extra long wear!

Write for full information and the name of your nearest Keystone distributor.

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ALL AMERICAN FOR PRECISION FILING

An exclusive Ball and socket file clamp and file setting square assure true vertical filing position regardless of distortion in file shank. Hand finishing entirely eliminated.

ALSO SAWS AND HONES

Attachments permit accurate sawing and honing with infinite speeds from 170 to 470 strokes per minute. Table can be tilted 15° front and back.

Reasonably priced, the All American will quickly pay for itself in any tool and die shop. Write for catalog, price and name of nearest dealer.

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(Chicago Suburb)

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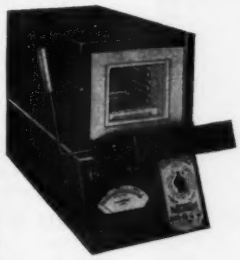
For Heat Treating Small Parts . . .



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Write today for literature on complete line of Huppert Furnaces and Ovens in floor and bench models. Ask for "Hints on Heat Treating."

Model No.	Inside Dimensions			Temp. Range	Watts 110 Volts AC	Price
	Wide	High	Deep			
434DL	4¼"	3⅝"	4¾"	300°—1600° F.	920	$ 90.00
439DL	4¼"	3⅝"	9"	300°—1600° F.	1650	120.00
436DL	4⅝"	3¾"	6"	300°—1900° F.	1650	130.00
5DL	4⅝"	3¾"	9"	300°—1900° F.	1750	176.00
9DL	6"	6"	6"	300°—1900° F.	2200	200.00
669DL	6"	6"	9"	300°—1930° F.	3000	248.00
10DL	8"	4"	6"	300°—1900° F.	2000	220 00
869DL	8"	4"	9"	300°—1900° F.	3000	265.00

Available for 220 Volt AC at small additional cost.
Stainless steel housing slightly higher.

K. H. HUPPERT CO.
Manufacturers of Electric Furnaces and Ovens
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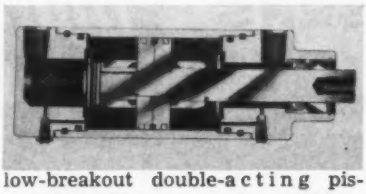
CIRCLE INFORM-A-GRAM KEY NO. 1414

Pneumatics & Hydraulics

PRODUCTS & PROCESSES & PRODUCTS

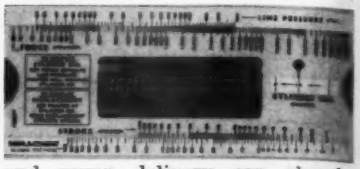
Automatic Moisture Separators, lubricators, regulators, filters, and filterators for compressed air systems are fully explained in a 20-page catalog. It details the automatic draining of receiver tanks as well as the usual separation of moisture, regulation, and lubrication of compressed air. Wilkerson Corp., 1640 W. Girard Ave., Englewood, Colo., provides copies of Catalog 157, or — **Inform-A-Gram No. A122**

A New Piston design incorporated into the 350 psi series hydraulic cylinders features a leak-proof "O" ring located between two



low-breakout double-acting piston rings. Sizes range from 1½" to 8" bores. Carter Controls, Inc., 2800 Bernice Rd., Lansing, Ill., or — **A123**

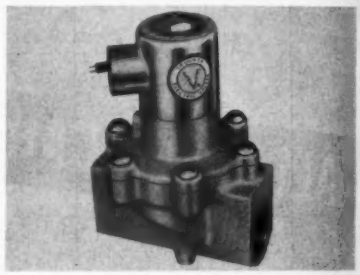
Use the Logansport Calculator to determine the velocity of air and hydraulic cylinders. Cylinder diameter, displacement, pipe area,



and pump delivery can also be found. For your copy of the calculator, write Logansport Machine Co., Inc., Logansport, Ind., or — **Circle Inform-A-Gram No. A124**

Stainless Steel Hose, Allflex, is explained in a folder which tells how the strength of stainless steel and the right wall thicknesses for ductility provides safe handling of pressures up to 4000 psi and temperatures through 1500°F. It's used to absorb vibration, correct misalignment, and offset motion. Allied Metal Hose Co., 3797 9th St., Long Island City 1, N. Y., or — **A125**

A New Series of High-Flow Two-Way Valves with ¾" and 1" dia orifices have been announced by Skinner Electric Valve Div'n, Dept. L175, 105 Edgewood Ave., New Britain, Conn. These small, compact



valves operate on a pressure differential of 5 to 150 psi. Literature is available from the company, or — **Circle Inform-A-Gram No. A126**

"Power Master Cylinders" includes engineering data and complete specifications for this line of air and low pressure hydraulic cylinders. Information on parts and accessories on the ½" to 6" bores in eleven standard mounting types is included. Catalog PMC58 is published by Petch Mfg. Co., 463 York Ave., Detroit 2, or — **No. A127**

"Tubing" with special smooth inside finish for hydraulic cylinders is the subject of a bulletin from The Babcock & Wilcox Co., Tubular Products Div'n, Beaver Falls, Pa. It explains how the carbon steel tubing is produced and gives specifications for micro-inch and special smooth finishes. Get a copy of Bulletin TB-428 from the company, or — **Inform-A-Gram No. A128**

JOHNSON
Johnson Model J ... A big, rugged saw that cuts anything—anywhere! 10" rounds, 18" flats, heavy structurals and odd shapes. Available in wet or dry cutting models, variable speed drive and optional equipment.
Johnson Model B ... Also available in wet or dry cutting models, variable speed drive. Will easily handle 5" rounds, 10" flats, odd and irregular shapes.
Johnson "Mobile" Model M ... same capacity as Model B, but wheel-mounted for fast, easy maneuverability indoors or out. Has self contained handle, power line, tool box for accessories.

MORE SAW for LESS MONEY

Only Johnson offers so much saw for so little money. Whether your requirements call for the tremendous performance of the big Model J, the amazing Model B, or the versatile "Mobile" Model M, there's a Johnson saw model, wet or dry, to match your metal cutting needs.

Remember... Johnson offers three husky, handsome models that'll do the job faster, better. They're beautifully engineered, semi-automatic, have centralized controls—plus many exclusive features that pay production dividends to *you!*

Priced right? Certainly! Compare them all before you buy and you'll agree, Johnson offers more saw for less money.

Write today... Ask for illustrated literature, specifications and prices on the full line of Johnson saws. Ask the man who has one... You'll be glad you did!

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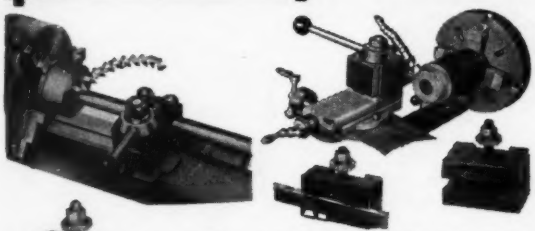
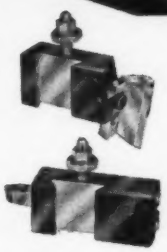
CIRCLE INFORM-A-GRAM KEY NO. 142

YOUR LATHES "TURN OUT" BIGGER PROFITS

WITH ALORIS QUICK CHANGE TOOL POSTS & TOOL HOLDERS





Change tools instantly—for turning, facing, drilling, boring, threading, knurling, cutting off or any operation.

- Maximum Repetitive Accuracy Assured
- No Shims . . . No Time Wasted
- Unlimited Versatility
- Saves 90% Set-up Time, 50% Production Time
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- Leading Lathe Mfrs. Recommend It
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- Unconditionally Guaranteed

NEW! Aloris Holder for Carbide Triangular Inserts.

Greater rigidity, versatility, efficiency & economy

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ALORIS TOOL CO., INC. 419 Getty Avenue Clifton, New Jersey

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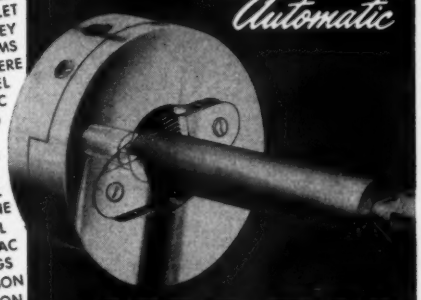
GOULD PUMP

SENECA FALLS Automatic



WORK DRIVER

DRIVES ANYTHING BETWEEN CENTERS

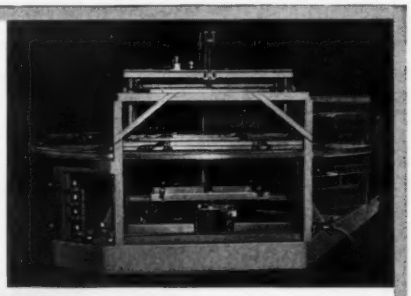
NEW JAWS with angular serrations . . .
SELF-ADJUSTING to work eccentricity . . .
PREVENTS strain on head center . . .
SAFER—no projecting parts to injure operator . .
FASTER—saves time, one operator can attend several machines. Models for all machines. Sizes for ¼" to 6⅞" work diameter; Priced from $81. Write for Bulletin D-57 for complete information.

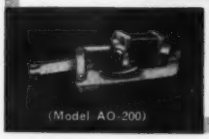
SENECA FALLS MACHINE

BETTER TOOLING SINCE 1864 SENECA FALLS MACHINE CO.
Seneca Falls, N. Y.

CIRCLE INFORM-A-GRAM KEY NO. 1433

COOL IDEA




(Model AO-200)

FOR REFRIGERATOR MANUFACTURERS

Knu-Vise air-operated clamps are featured on a new 3-station automatic machine developed by the Brown Machine Company, Beaverton, Michigan, for vacuum forming inner door panels and other refrigerator parts at a maximum production rate.

The machine is completely automated with air clamps, mold table, vacuum system and fans, and rotating mechanism all operating from a single switch. 100 panels per hour—as big as 42" x 72"—can be produced.

Quality standards are so high that only dependable Knu-Vise air-operated clamps can be used. Take a tip—investigate Lapeer today!

Manufacturers of over 150 models of manually and air-operated clamps and pliers

KNU-VISE PRODUCTS LAPEER MANUFACTURING CO.

3064 DAVISON ROAD
LAPEER, MICHIGAN

WESTERN DIV.: PECK and LEWIS CORPORATION 4436 Long Beach Ave., Los Angeles 58, Calif., ADams 3-7148
CANADIAN DIV.: HIGGINSON EQUIP. SALES LTD. 1131 Pettit Road, Burlington, Ontario

CIRCLE INFORM-A-GRAM KEY NO. 1432

Need accurate versatile Remote Control? Check...

Sperry

Hydraulic REMOTE CONTROLS

- circular motion
- straight line motion
- multiple control
- geared take-off
- manual or automatic

the only Single Tube Balanced System

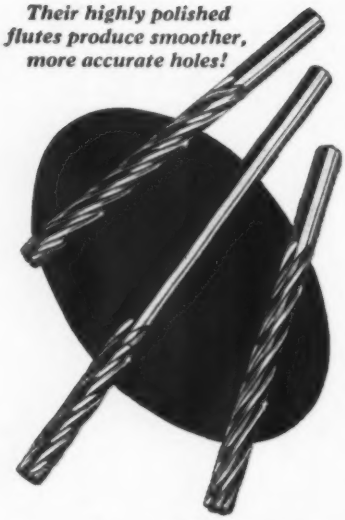
SPERRY PRODUCTS, INC.
4010 Shelter Rock Road
Danbury, Connecticut

☐ Send complete hydraulic control information
☐ Have technical representative call

NAME_____TITLE_____
COMPANY_____
ADDRESS_____
CITY_____ZONE_____STATE_____

CIRCLE INFORM-A-GRAM KEY NO. 1434

Their highly polished flutes produce smoother, more accurate holes!



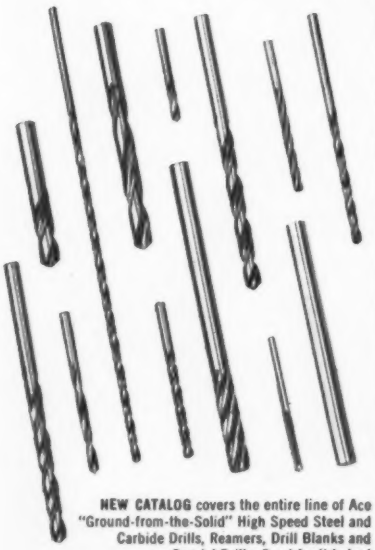
ACE

Drill Length and Chucking

REAMERS

For the finest reamers that money can buy, always specify "ACE"! They're made of top quality, pre-hardened high speed steel and produced by the Ace-originated "ground-from-the-solid" process. Results? Stronger, more highly polished right hand spiral flutes. Keener, longer lasting cutting edges. Plus smoother, more accurate holes at lower cost!

Call your local Ace Drill Distributor today!



NEW CATALOG covers the entire line of Ace "Ground-from-the-Solid" High Speed Steel and Carbide Drills, Reamers, Drill Blanks and Special Drills. Send for it today!

ACE DRILL
ADRIAN, MICHIGAN

ORIGINATORS OF "GROUND-FROM-THE-SOLID" DRILLS
CIRCLE INFORM-A-GRAM KEY NO. 1441

Pressworking

PRODUCTS & PROCESSES & PRODUCTS & PROCESSES & PRODUCTS & PROCESSES & PRODUCTS

A 40-Ton OBI Press featuring steel frame weldment that provides generous ram and bed areas and depth of throat to accommodate large die sets, is described in a bulletin. The presses are ideal for die cast trimming and electronic work. Get the bulletin from Sales Service Machine Tool Co., 2363 University Ave., St. Paul 14, Minn., or — **No. A129**

Fully-Automatic Feed for high speed grinders and special press operations is provided by Feedall's Model 2700 parts feeder. It orients

and feeds up to 7″ dia rolling parts and up to 15″ long sliding parts in continuous production. For details, write Feedall, Inc., 38399 Pelton Rd., Willoughby, Ohio, or — **No. A130**

Greater Stability and useful life have been added to Jaco's automatic stock reels by including new coil support members of case hardened steel. The reels can handle material as heavy as 300 lbs. Jaco Devices, Inc., 96 High St., Hingham, Mass., or — **Circle Inform-A-Gram No. A131**

A New 25-Ton 6-Ft Bed Press Brake features adjustable stroke and dual-speed operating cycle with power work stroke. Called the Di-Acro Hydra-Power Model 16-72, its stroke adjustment feature en-

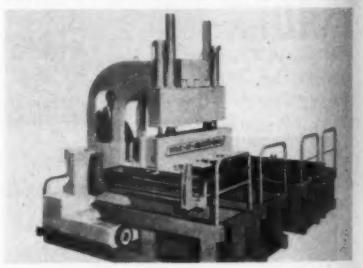
ables the operator to pre-set the stroke of the ram to the narrowest possible opening for each job. O'Neil-Irwin Mfg. Co., 626 8th Ave., Lake City, Minn., or — **Circle Inform-A-Gram No. A132**

A Versatile Sheet Metal Shear and forming machine, the Metl-master, can do square and circle shearing up to 49″ dia inside throat, and freehand contour shearing up to 0-32″ metal thickness. Forming

operations such as flanging, beading, joggling, etc., can also be done. Get literature from Lennox Tool and Machine Builders, Lima, Ohio, or — **Circle Inform-A-Gram No. A133**

A Gang Punching Machine features light tonnage and large bed and ram area. It provides 60-ton capacity and 126″ between housings. Other dimensions include 4″ stroke; 4″ ram adjustment; 14″ shut height, bed to ram; and 45 strokes/min operating speed. Verson Allsteel Press Co., 9300 S. Kenwood Ave., Chicago 19, or — **Circle Inform-A-Gram No. A134**

Lift and Move single or multiple plate loads from 2000 to 10,000 lbs and 10′ x 40′, with this new combination vacuum plate lifter and feeder. The unit rides on rails and



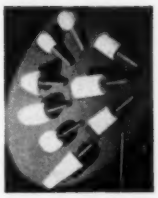
can be made semi-automatic or fully-automatic with remote controls. Literature is available from Vac-U-Mation Div'n, F. J. Littell Machine Co., Dept. 4-F, 4127 N. Ravenswood Ave., Chicago 13, or — **Circle Inform-A-Gram No. A135**

The Metal Sheet Feeder discussed in a new bulletin has a capacity of up to 6000 lbs, speed to 85 sheets/min, and continuous reloading feature. Production advantages and other details are given in this bulletin available from The Dexter Co., Div'n of Miehle-Goss-Dexter, Inc., Pearl River, N. Y., or — **Circle Inform-A-Gram No. A136**

TICKLISH FINISHING JOB?

do it better with a Paramount Felt Bob

If you have a tough polishing, buffing, lapping or de-burring finishing problem where tolerances must be held close, solve it by putting a Paramount Bob on the job. Seven custom shapes, 42 sizes, four degrees of hardness from soft to rock hard — there's a Paramount Bob ideal for every close-quarters precision finishing job. For example:



MICRO-FINISHING

Paramount Felt Bobs make ultra-fine finishing of surfaces quick, easy and economical.

DIE AND MOLD MAKING

Thousands of die and mold makers depend on Paramount Bobs to perform precision finishing and buffing operations. Ideal for removing burrs without destroying close tolerances.

NEW BOB ASSORTMENT KITS

K-1 Assortment includes 24 mandrel mounted bobs, 36 small wheels, touch-up pads — 66 pieces all together — packaged in one convenient bench top box. (K-2 Assortment also includes four sticks assorted polishing compounds.)

These handy assortments provide bobs of just the size, shape and hardness you want — and at $10.95 (K-1) and $12.95 (K-2) they are far below the cost of buying bobs separately.

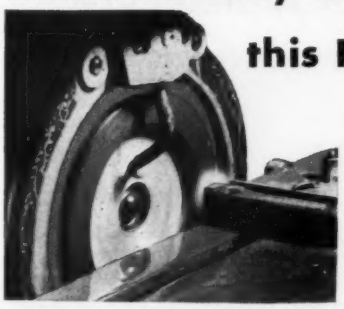
See your jobber or write for literature

BACON FELT CO. 467 West Water St., Taunton, Mass

JOBBER INQUIRIES INVITED

CIRCLE INFORM-A-GRAM KEY NO. 1451

NOW...Better by actual test...



this NEW A.I.T. "E-2" Diamond Wheel for...

ELECTROLYTIC GRINDING

The exclusive "E-2" bond in A.I.T. diamond wheels has been developed specifically to guarantee that you get the FULL VALUE out of Electrolytic grinding of carbides. We can prove this in YOUR plant, on YOUR grinders, with these results:

1. **Wheel pre-run to eliminate break-in time in YOUR plant.**
2. **Faster stock removal.**
3. **High peak removal for longer intervals**
4. **Longer wheel life.**
5. **Less corrosive action**
6. **Specially designed wheel to reduce weight and distribute electrolyte efficiently**

Remember, to get these FULL VALUE results, be sure to send for complete test data today. 181

A.I.T. Diamond Tool Co.

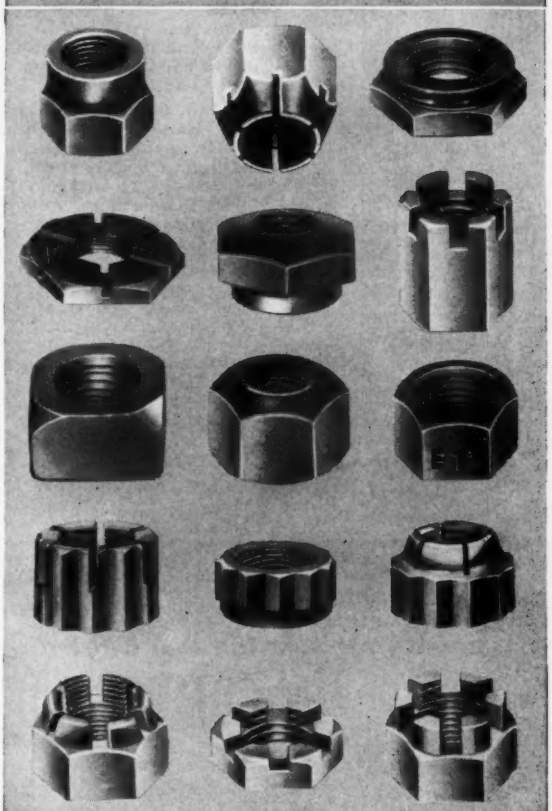
8217 N. KIMBALL AVE.
SKOKIE, ILLINOIS

CIRCLE INFORM-A-GRAM KEY NO. 1452

SPECIAL NUTS

to specs. 7/16"—4 1/4" cross flats

special machines + large stock of material × years of experience = speedy deliveries high quality low prices



Here are a few samples made to customers specifications . . Our batteries of special high-speed multi-spindle, automatic machines make possible fast and accurate production of hexagon nuts of non-standard height and special shape from carbon or alloy steel, Naval bronze or other non-ferrous metals; also AN 310 through AN 335 as per latest Airforce specifications. Very often the special nut you require may be similar to one we are already making and a simple modification would result in a price advantage and quicker deliveries to you . . Send us your blueprint and particulars —let us quote on your requirements . . We also have a catalog that contains complete specifications, engineering data and prices regarding our standard nuts.

*12 Pointer Standards, sizes: 1/4" to 3/4"—brochure on request

NATIONAL MACHINE PRODUCTS

*Manufacturer of Standard and Special *12 Pointer and Hexagon Nuts . . . "Huglock" and "Marsden" locknuts.*

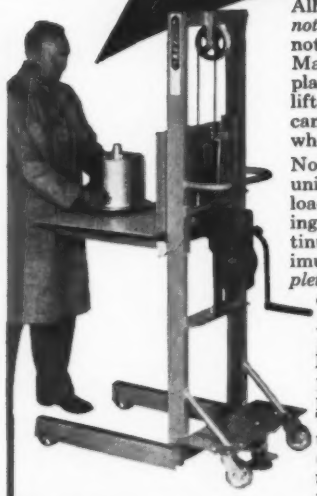
44225 Utica Rd., UTICA, Michigan

an SPS/COMPANY

CIRCLE INFORM-A-GRAM KEY NO. 1453

ALL NEW

MARK II
Shoplifter
$1950.00 FOB Chicago



All lifters at this price *are not* the same. Compare and note the quality of the new Mark II, which now replaces the Type D Shoplifter. Full 750 lb. capacity can be handled safely anywhere on the platform.

No-drift, full control hoist unit. Raise or lower the load to fractional positioning. Built for years of continuous service with minimum maintenance. *Complete* safety features included at no extra cost.

Applicable in small plants for "too heavy to lift loads" and in large plants to supplement powered equipment. The economical way to transfer molds and dies, unload trucks, stack in narrow aisles, or raise parts and machinery to working levels.

Write for specifications and other details.

ECONOMY ENGINEERING
4509 W. Lake St., Chicago 24, Ill.

CIRCLE INFORM-A-GRAM KEY NO. 1461

PRECISION MACHINE TOOLS FOR ANY JOB ARE MADE BETTER BY

KAUFMAN

Trying to solve a knotty problem? Kaufman Drilling and Tapping Machines — assembled with our standard units or custom-made to your order — can help you cut production costs. From the engineer's drawing board to final installation, Kaufman's time-proven "know how" is saving money for many of the nation's leading manufacturers. Whether you need a machine for single or multiple operation or a machine for a new, unusual job — see Kaufman. Write or telephone for full information today!

KAUFMAN MFG. CO.
529 S. 29th Street Manitowac, Wisconsin

CIRCLE INFORM-A-GRAM KEY NO. 1463

You don't know ***IMPORTANT*** *things about Precision Internal Gaging until you know . . .* COMTORPLUG

These firms know:

Airosearch Mfg. Co.
Allison Div.
Apex Electrical Mfg.
Bendix Aviation
Buick Motor Div.
Century Electric Co.
Chicago Pneu. Tool
Chrysler Corp.
Continental Motors
Curtiss-Wright
Detroit Transmission
Douglas Aircraft
Fairchild Engine & Airplane Co.
Falk Corp.
Ford Airplane Engine
Ford Motor Co.
General Electric Co.
Hamilton Standard Div.
Harris Seybold Co.
Homelite Corp.
Hughes Aircraft Co.
Int. Harvester Co.
Jacobs Mfg. Co.
Lycoming-Spencer Div.
McDonnell Aircraft
Montrose Div. Bendix
National Lead
Northrop Aircraft
Pontiac Motor Div.
Scintilla Magneto
Steel Products Eng.
Studebaker-Packard
Sylvania (Atomic Div.)
Warner Gear Div.

The full list reads like a "Who's Who" of U. S. Industry!

Unique expanding plug gage shows actual hole size, measures front or back taper, ovality, barrel shape, etc.

⅛" to 10" dia.

Why ***IMPORTANT*** . . .

With Comtorplug internal gage you need NO GET-READY program. NO TRAINING needed, NO COMPRESSED AIR LINES, ELECTRONIC GEAR, etc. You get positive AUTOMATIC 2-POINT GAGING within .0001". Shows EXACT hole size. FIXED, not passing, reading. Shows EXACT amount of front or back taper, ovality, barrel shape, etc. Here is truly PRECISION MADE EASY!

Get important facts, request Bulletin 50.

Comtor Co., 82 Farwell St., Waltham 54, Mass.

REQUEST BULLETIN 50

CIRCLE INFORM-A-GRAM KEY NO. 1462

Drill Hardened Steels without Annealing—

With the new, improved "HARDSTEEL" Drill, you can do accurate, smooth drilling, countersinking, counterboring and reaming in steels hardened by any process without first annealing the work. And they work with equal ease on work-hardening steels and high carbon–high chrome steels of any degree of hardness.

"HARDSTEEL" Drills fit standard drill presses. They save time and reduce rejects. They permit engineering changes requiring additional drilling after hardening. And parts drilled after hardening always match at assembly.

Write for a copy of the "HARDSTEEL" Operators Manual showing how "HARDSTEEL" drills are cutting costs in thousands of plants.

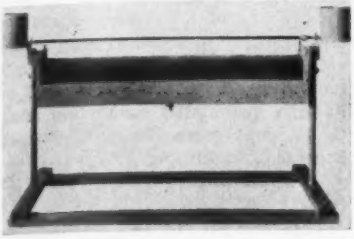
You Harden It—We'll Drill It—
With "HARDSTEEL"

BLACK DRILL COMPANY, INC.
1368 East 222nd St. • Cleveland 17, Ohio

"HARDSTEEL"

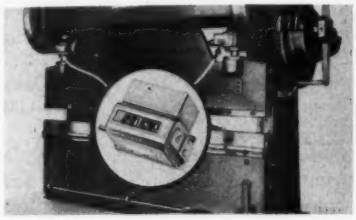
CIRCLE INFORM-A-GRAM KEY NO. 1464

Higher Quality Metal Stampings and longer die life are advantages of the new heavy-duty strip stock oiler. Model C lubricates strip stock leading to a press at any required



height, and handles sizes from 26 to 7 gauge and up to 72" wide. For information, write Stamping Specialty Co., Inc., 2141 N. Sherman Dr., Indianapolis 18, or — **No. A137**

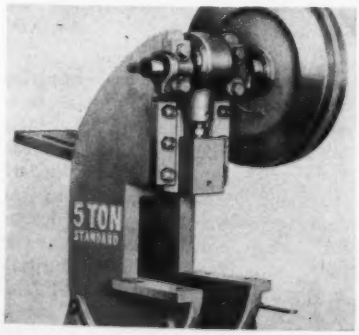
This New Counter, the Productimeter, is designed for press brakes to indicate ram adjustment and to limit the ram adjustment at its ex-



treme up and down travel. Model 4-CS-8996-6 has been announced by Durant Mfg. Co., 1974 N. Buffum St., Milwaukee 1, Wis., or —**No. A138**

Four-Column Hydraulic Presses are covered in a bulletin which gives the important features, construction facts, data on types of controls, pumps, and cushions available. The presses are available in 50- to 2000-ton capacities. Write to A. B. Farquhar Div'n, The Oliver Corp., 128 N. Duke St., York, Pa., for a copy of Bulletin H-5000, or— **No. A139**

A New 5-Ton Standard Punch Press is low in cost but designed to supply all necessary press features for most standard light manufacturing requirements. Series 40



has 1" stroke, 8" maximum shut height, and 6" x 8" bed dimensions. Benchmaster Mfg. Co., 1835 W. Rosecrans Ave., Gardena, Calif. — **Circle Inform-A-Gram No. A140**

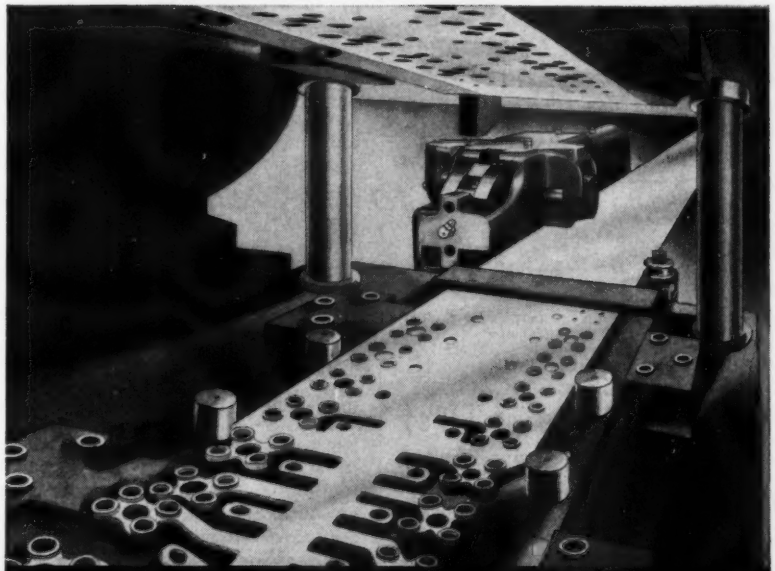
Extrusion Presses and Processing machines for all metals are presented in a bulletin from Sutton Engineering Co., First National Bank Bldg., Pittsburgh 22. Described are horizontal and vertical presses, hydraulic stretchers, rotary swagers, and centerless bar turners. Bulletin 50 can be obtained from the company, or — **No. A141**

Pressworking

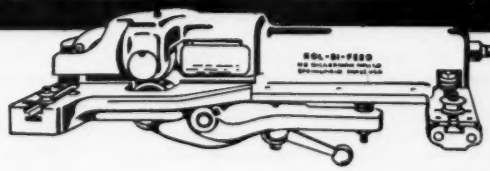
PRODUCTS & PROCESSES & PRODUCTS

Large, Heavy-Tonnage Drawing, punching, and blanking work can be handled by the Niagara Series SE straight-side single-action eccentric-geared presses described in a 43-page bulletin. Detailed drawings and information on operating and design features, are given. Bulletin 66A is available from Niagara Machine & Tool Works, 683 Northland Ave., Buffalo 11, or — **No. A142**

Dickerman Feeds *Present...*



A Press-Eye View of Precision!



Hour after hour, day after day, Dickerman Press Feeds feed more presses, for more production, more profits!

A standard "off-the-shelf" feed, at a fraction of the cost of special feeds, can solve the problem of speed, accuracy and dependability and pay for itself in days. Every one of the 14 models is press-room proved on thousands of different and unusual applications.

Dickerman

H. E. DICKERMAN MFG. CO.
321-417 Albany St. • Springfield, Mass.

Send for information on the complete Dickerman "standard" Press Feed line — experience unlimited versatility.

CIRCLE INFORM-A-GRAM KEY NO. 147

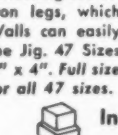
Offers Many Big Advantages

- ONE-HALF THE WEIGHT
- TRI-METAL CONSTRUCTION — Aluminum — Cast Iron — Steel
- 6-SIDE UTILITY — Can Use Head-Type Bushings, on Sides, Top, Bottom
- 5 HANDLE LOCATIONS — Handle can be attached to Any Side or Bottom
- ONE HAND OPERATION — Thumb screw releases Lid Instantly
- LEAF "POP-UP" — Automatic Action Spring Plunger Snaps Lid Open
- STABLE — Rugged Construction

Standard Parts is First with Exclusive New "TUMBLE" Box Jig

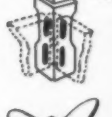
New design features, new engineering concepts, new construction techniques . . . are incorporated in this outstanding line of "Tumble Box Jigs. By combining 3 metals — aluminum, cast iron, steel — half the weight has been eliminated. This increases efficiency and production. The sturdy handle (can be located on any side) makes tumbling fast, easy and safe.

Bushings can be used on all 6 sides. A unique interlocking feature is the aluminum through the cast iron legs, which assures strength and stability. Walls can easily be machined without distorting the Jig. 47 Sizes available 1" x 1" x 1" to 4" x 8" x 4". *Full size Tracing Templates are available for all 47 sizes.*



Interlocking Leg Joint

Aluminum goes all the way through the cored slots in the cast iron legs — forms a unified, interlocking joint — assuring light weight, but rugged strength.



HANDLE may easily be attached on any side or bottom of the jig as needed.

TUMBLE — Universal tumble direction is advantage of this light-weight jig — where handle can be located where desired.

Ask for TUMBLE JIG BULLETIN

STANDARD PARTS CO.

1002 BROADWAY • BEDFORD, OHIO

CIRCLE INFORM-A-GRAM KEY NO. 1481

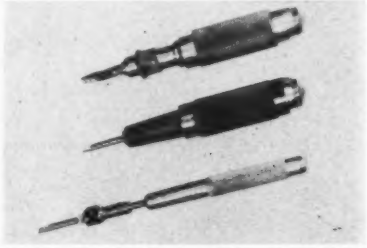
Assembly

PRODUCTS & PROCESSES & PRODUCTS & PROCESSES & PRODUCTS & PROCESSES & PRODUCTS

Rivet Turret Terminals into punched or drilled terminal boards, using the special spin-riveting machine announced by Hill Machine Co., 1311 Eddy Ave., Rockford, Ill.

Elimination of cracking and splitting of terminals and consistency of performance are advantages. Contact the company for details, or —**Circle Inform-A-Gram No. A143**

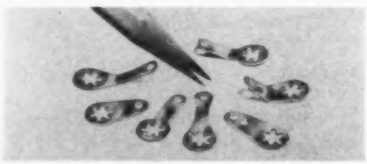
Three Designs of safe-torque hand-operated drivers have been announced by Scully-Jones and Co., 1901 S. Rockwell St., Chicago 8.



Once the torque setting is made, it is not affected by repeated tightening, changes in temperature or humidity, and other variables. For more information, write to the company, or — **No. A144**

Self-Insulatling Fasteners for use in high voltage circuits are made by automatically molding plastic heads onto metal fasteners. The mechanical-property advantages of the metal and the electrical-property advantages of the plastic eliminate the need for separate insulation or insulating assemblies. Gries Reproducer Corp., 400 Beechwood Ave., New Rochelle, N. Y. or — **Inform-A-Gram No. A145**

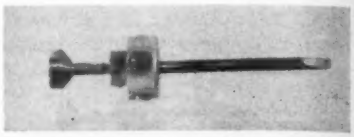
Seven New Lock Washer Terminals, designed to fit almost every need, are now available from stock



from Zierick Mfg. Corp., 110 Beechwood Ave., New Rochelle, N. Y. Sample kit and catalog sheet are available from the company, or — **Circle Inform-A-Gram No. A146**

"Setomatic, Automated Set Screw Driver" is a bulletin which gives dimensions, basic engineering specifications, and major operation and application features for the device, which can be used as an attachment for a single machine or in fully automated production lines. Get a copy from Standard Pressed Steel Co., Jenkintown, Pa., or — **Circle Inform-A-Gram No. A147**

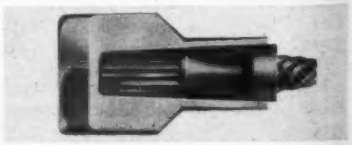
This Midget Torque Screwdriver maintains its torque setting within 5% and has ¾" maximum dia Model J has a patented spring loaded ball and detent principle which eliminates wear on the torque control



components and makes servicing unnecessary. Overload Control Co., 260-11 Langston Ave., Glen Oaks, Floral Park, N. Y., or — **No. A148**

"Brazing News" gives ideas on what can be done with brazing and describes good brazing practices. This bulletin also gives qualities of Easy-Flo 45 brazing alloy and lists what it can be used for. For your copy of Bulletin 79, write to Handy & Harman, 82 Fulton St., New York 38, or — **No. A149**

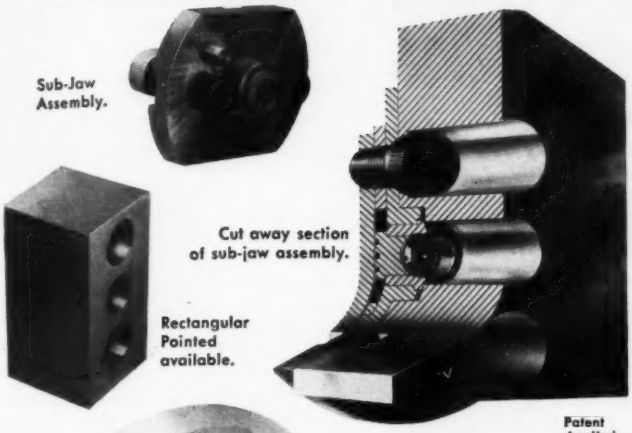
These Wedge Pruf Screw Extractors feature an outer hexagon jacket that is spline fitted to the heat-treated high-alloy extractor and shaped to allow maximum torque. If the extractor should break,



however, a piece still projects above the shoulder to allow removal. Roddick Tool Co., 1023 Pauline St., Anaheim, Calif., or — **No. A150**

"Helpful Hints on Applying Standard Fasteners" contains technical facts to help users obtain maximum economy and performance in the application of standard fasteners. It aids in selecting the right grade of bolt, proper torque for bolts, bolt stresses, etc. Get your copy from Russell, Burdsall & Ward Bolt and Nut Co., 101 Midland Ave., Port Chester, N. Y., or — **Circle Inform-A-Gram No. A151**

BEDFORD'S new type Top-Jaws ADJUSTS TO YOUR T.I.R. REQUIREMENTS!



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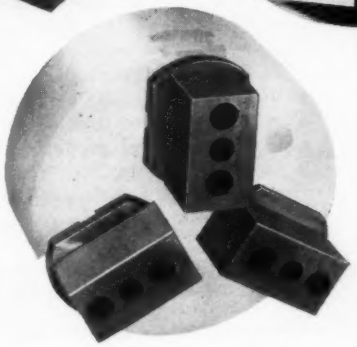

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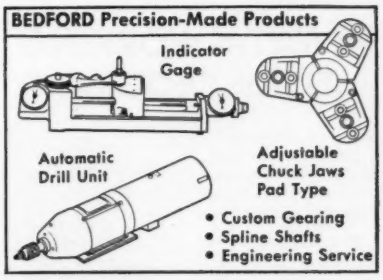

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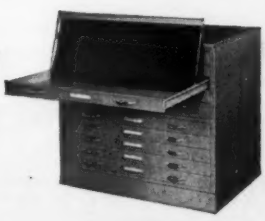

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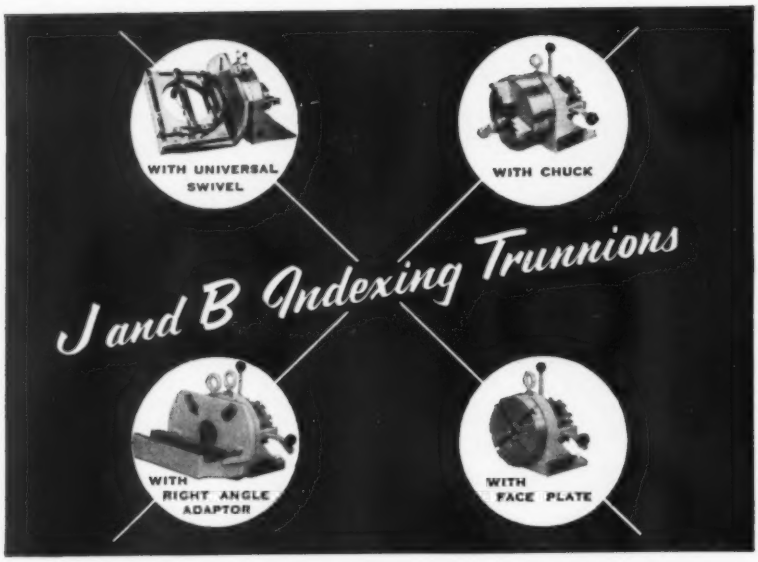

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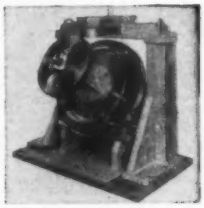

Model MT300 solved the problem of machining guided missile heads with no distortion and where odd radial angles were required.

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A Phenolic Fiber Laminate, Richlite, is an industrial plastic for dies, tools, templates, and bearings. A bulletin gives advantages and suggested uses of this high-strength sheet material, and lists the strength and electrical test properties. Get a copy of this bulletin from The Henry Co., 6405 E. Kellogg, P. O. Box 3021, Wichita, Kan., or — **No. E2.**

A Tough Epoxy Compound, Resin 611, that can be carved with standard hand tools, is described in a bulletin which gives features, applications, average physical properties, and working instructions. The resin can be handled either as a casting or splining material and cured at room temperature with no heat required for setting. Bulletin 611 is available from Marblette Corp., 37-31 13th St., Long Island City 1, N. Y., or — **Circle Inform-A-Gram No. E3.**

Plastic Coating Applications are suggested in a new bulletin from Furane Plastics Inc., 4516 Brazil St., Los Angeles 39. Different types of sealants, adhesives, and pastes are discussed and compared. Contact the company for a copy of this bulletin, or — **No. E4.**

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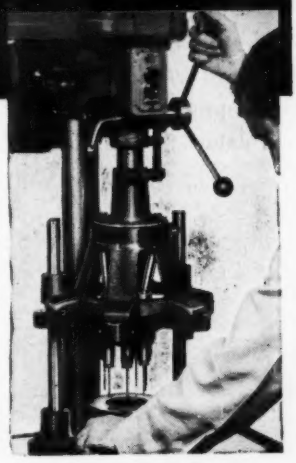

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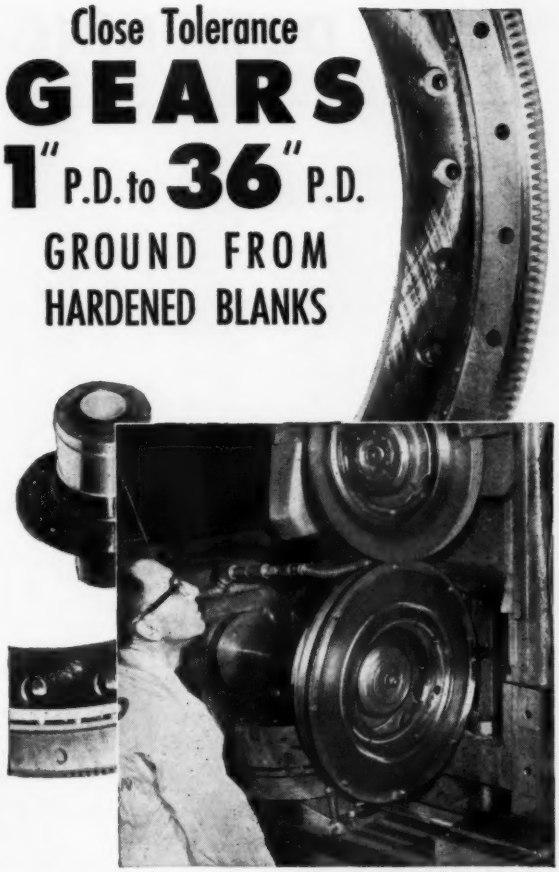

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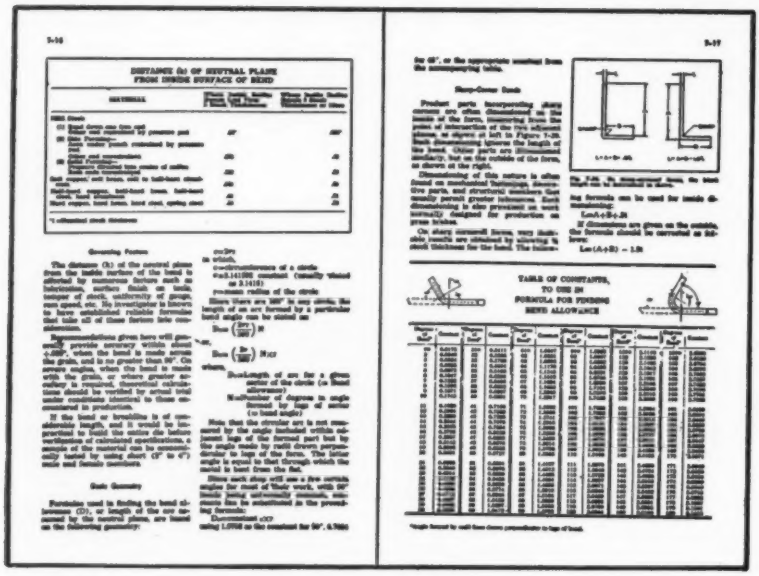

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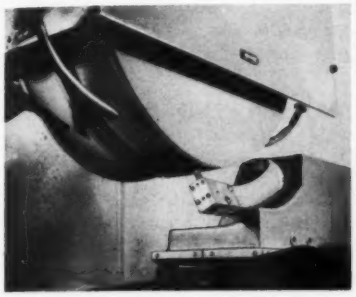
SINGLE DIAMOND NOW DRESSES DOUBLE GRINDING WHEEL

Airfoil lugs on jet engine blades can now be contour-ground two at a time to 0.0002", with only one diamond used to dress the double grinding wheel.

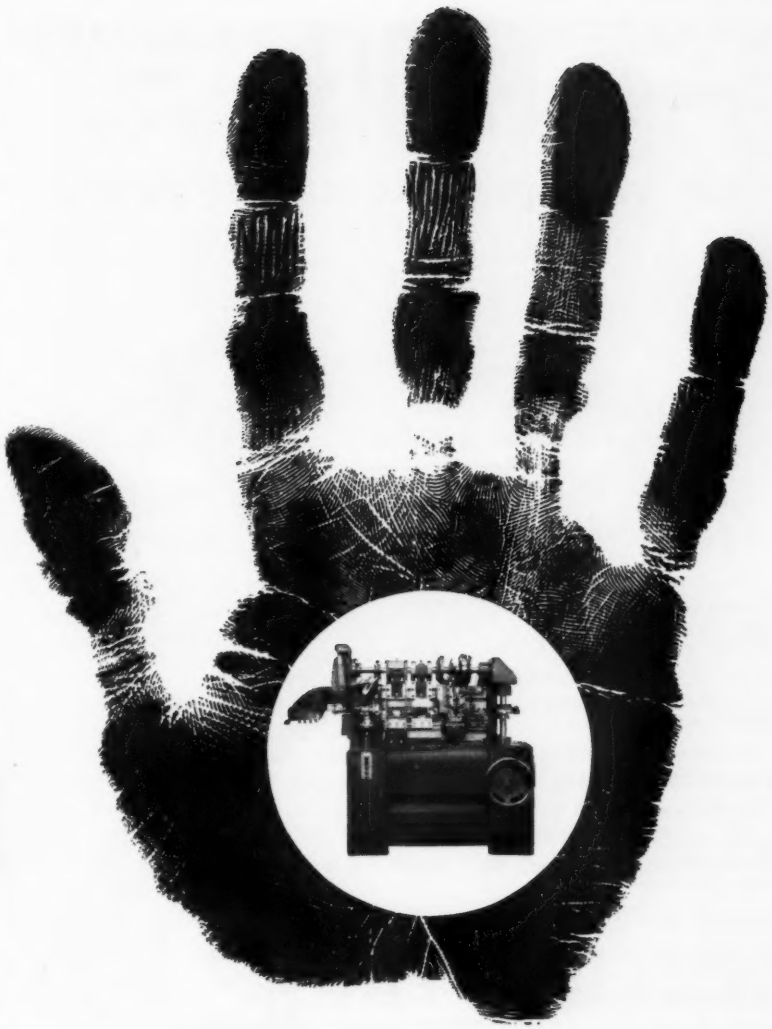
This job is being performed at Thompson Products' Jet Division, where a 41-machine grinding department is producing seven different blade sizes for the Pratt & Whitney J-7S engine.

The single-diamond technique, so far as is known, is the latest in wheel dressing of complex contours and double wheels. The unit succeeds the conventional two-diamond type and was developed by Hoglund Engineering & Manufacturing Co.



Key to dressing accuracy is cam-control of the diamond so that its point remains normal to the wheel face during the dressing cycle. After about 50 airfoil lugs are ground, the dresser moves into position under the double wheel. The diamond starts its dressing cycle at the left-hand corner and proceeds to the right-hand corner. As it traverses the wheel face, the diamond is pivoted about its own point so that it is always at a right angle to the face.

Inside the dresser is a hydraulically-powered slide. The slide mounts two templates: a contour template to control diamond movement in and out of the wheel during traverse, and an angular position template to rotate the diamond. Action of a follower on the contour template is reduced to diamond movement through a 10:1 inclined plane cam. This assures the 0.0002" repeat accuracy which would be impractical to obtain through normal pantograph linkages. A follower on the angular position template transmits motion to a rack and pinion assembly which simultaneously rotates the diamond.



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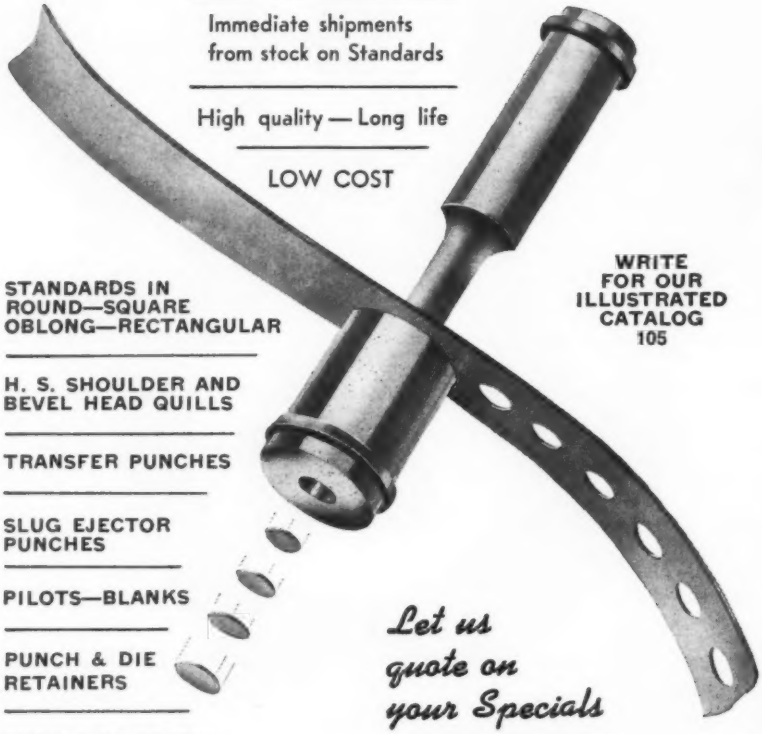

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More than 125,000 utility drawer back panels were recently produced at Hotpoint without regrinding the Vulcan Vuldie die sections.

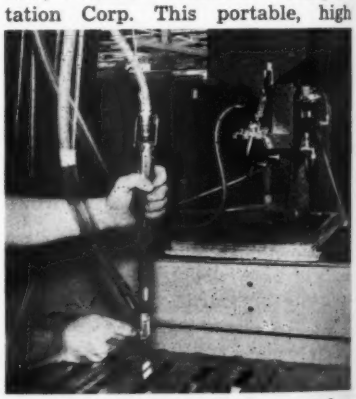
The 4-station progressive die in this application notched, perforated, cut off, and formed parts at a speed of 30 strokes/min. To accomplish this, Hotpoint required a tough die steel that would hold a knife-like edge, harden thoroughly, and withstand tremendous shock.

Vulcan Vuldie, manufactured by Vulcan-Kidd Steel Division, H. K. Porter Company, Inc., was selected because of these proven characteristics. It is a 5% chrome air hardening die steel, AISI A-2 type, available as bar stock, billets, and forgings, either hot forged, hot rolled, or cold finished. Steel of the same analysis is also precision ground for gage and die manufacture.

Automated Fastening Equipment Reduces Assembly Time

Efficiency in attaching plates and panels to computer frames has been stepped up at IBM by using automated fastening equipment on the assembly line.

Assembly time has been reduced 30% by use of the Jet-Setter screw feeding equipment manufactured by Parker-Kalon Division, General American Transportation Corp. This portable, high



speed fastener equipment makes possible the installation of fasteners at any point along a 6' length of computer frame without moving the workpiece. Previously the 51 No. 10 slotted pan head Sems screws were started by hand screwdriver and then power driven. Now, with the Jet-Setter adapted to an Ingersoll Rand driver, the screws are started and driven in one operation.

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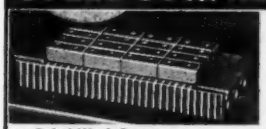

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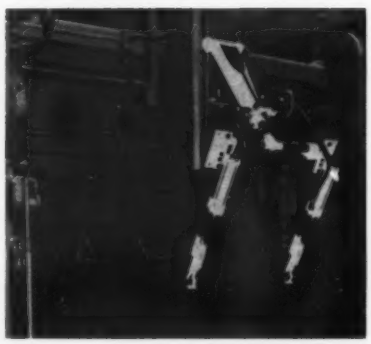
IRON HAND NOW UNLOADS PRESS BRAKE

A press brake, used to produce end frames for Westinghouse medium duty transformer tanks, is now equipped with an Iron Hand press unloader. This first installation of a standard Iron Hand on a Cincinnati Shaper press brake has resulted in increased production, and lower cost per part for Westinghouse. In addition, it provides greater safety to the attendant, who now does not have to put his hands under the die area to unload the end frames.



The frames unloaded automatically are 9″ wide x 32″ long, and are made of 0.093″ mild steel. After they are formed on the press brake they are gripped at two points by the jaws of the Iron Hand, swung out of the die area, and stacked beside the machine. The swinging arms then move back into position for the next part. Since the unloader is mounted on the frame of the press brake, its installation requires no additional floor space.

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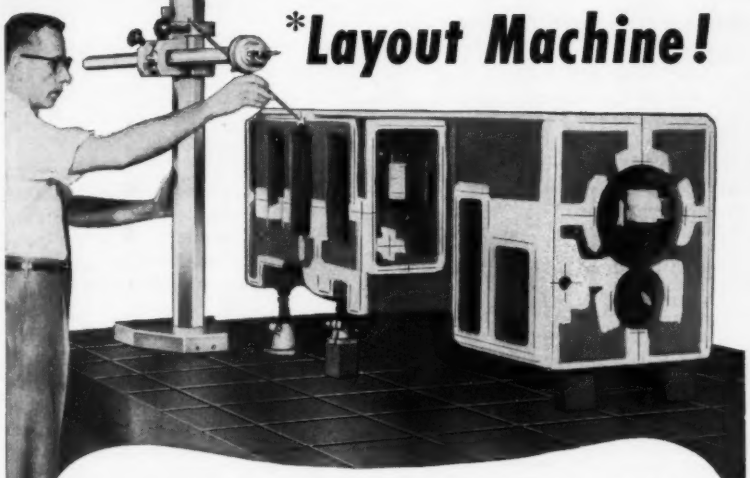

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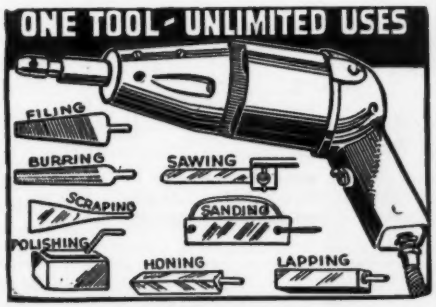

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J. Tom Maidens has been appointed sales supervisor for the End Mill Division of Eclipse Counterbore Co., and will make his headquarters in Detroit.

Now serving in the newly-created position of general sales manager of Vascoloy-Ramet Corp. is **Burton J. Naden.** Formerly assistant manager of the General Products Dept., he will make his office in Waukegan, Ill.

The Chicago Screw Co., Division of Standard Screw Co., has announced the promotion of **Robert B. Noren** to sales manager, Special Products Division. **H. T. Thompson** was also promoted to sales manager of standard fastener products for the Chicago Division.

Appointed vice president in charge of national sales for A. Finkl & Sons Co. is **A. F. Finkl,** He succeeds **E. H. Graham,** who now serves as executive vice president.

Hevi-Duty Electric Co. announces additions to its furnace staff, following the acquisition of the Industrial Furnace Division of Eclipse Fuel Engineering Co. **Richard Hayden** is in charge of gas furnace sales, **Norman Acker** performs liaison work between the engineering, sales, and production departments, and **William Swanson** is sales and service engineer for automatic heat treating units.

Newly appointed sales manager of Valvair Corp., **Duane R. Branaka,** will supervise manual and pilot-operated control valve sales.

The Unistrut Products Co. has made known the appointment of **F. W. Ingraham** to the position of sales manager.

Norton Co. recently appointed **William A. Simonds,** former abrasive engineer in Texas, to the western Massachusetts area, and **Robert C. Divoll,** formerly of the Pittsburgh area, to Dallas. New field engineers are **Harold F. Platt** Cleveland; and **John H. Hartleb,** Los Angeles.

New sales manager of the S. W. Card Division of Union Twist Drill Co. is **Howard R. Hoskin.**

Taking over as vice president in charge of sales for Pesco Products and Wooster Division of Borg-Warner Corp. is **Donald R. Spotz.**

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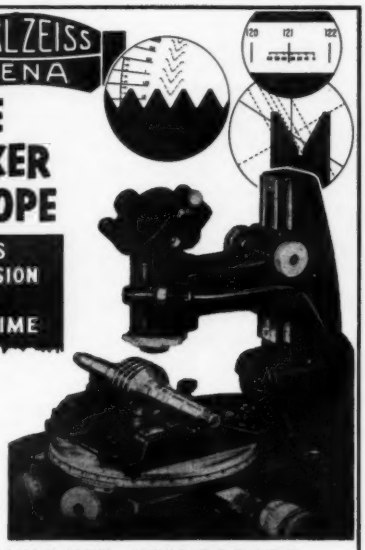

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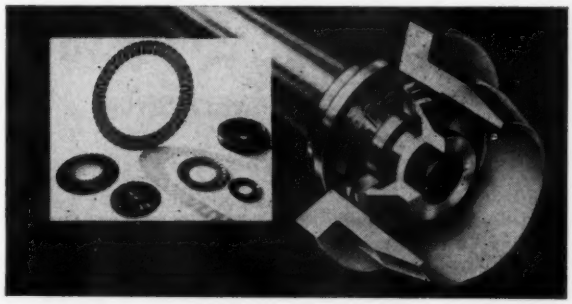

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TOOLING & PRODUCTION Magazine

The number of subjects in which T&P's editors present material in just a few issues adds up very rapidly. Most articles are of lasting interest and have future reference value in solving tooling and production problems.

This cumulative index will build up progressively during each calendar year. Each issue will carry a cumulative index of material contained in all previous issues of the same year, with each January issue carrying the complete index of the twelve issues of the previous year.

We suggest you see to it that your copies of T&P are retained for future reference so you can get the full benefit of this new, unique and useful index.

The Publisher

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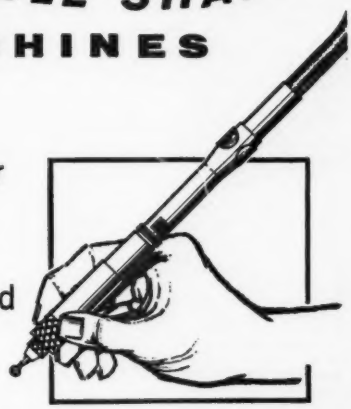

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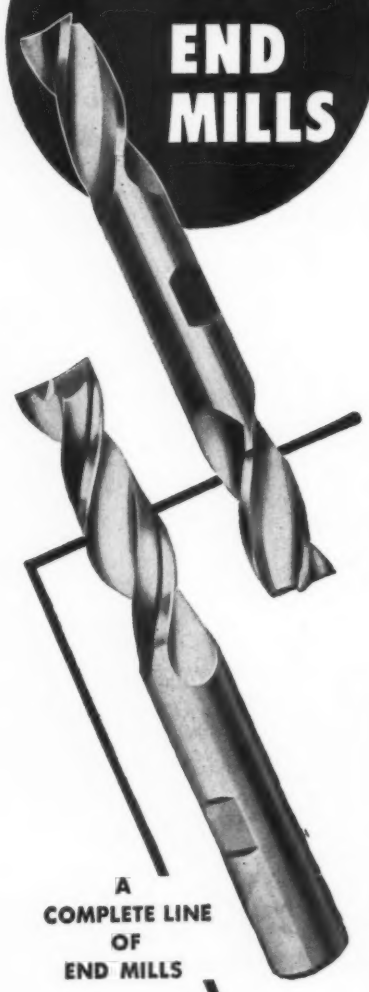

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The five-second cycle is as follows: 1) operator loads; 2) table indexes; 3) clamps at the two work stations clamp the work in the workholding fixtures; 4) the combination tool in the first drill press turns two outside diameters, reams the hole in the casting, and spot-

faces both the top of the piece and the bottom of the hole. At the second station, the diehead threads the outside diameter and then opens: 5) spindles retract (cocking the self-opening revolving diehead); 6) workholding clamps open; 7) table indexes and operator unloads.

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Steelcraft Tool Co., of Detroit, used to use three different grinding wheels to grind angles on straight high speed steel form tools. Then Bay State distributor Jim Frederick, of Detroit's Industrial Abrasives Co., showed them how a single Bay State specification would cut *fast* for roughing and *fine* for finishing.

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Steelcraft operator John Kulpa checks performance of new Bay State wheel on high speed steel form tool job. (Guard removed for photography).

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